



A Guide to Waste Audits and Reduction Workplans for Construction and Demolition Projects

As Required Under Ontario Regulation 102/94.

To obtain copies of this or other guides to the 3Rs Regulations, telephone, write or fax:

3Rs Regulations
Ministry of Environment and Energy
135 St. Clair Avenue West, 2nd floor
Toronto, Ontario M4V 1P5

Tel: 1-800-565-4923
(416) 323-4321
Fax: (416) 323-4564

The ministry welcomes comments on the guides. Please submit them to the above address.

Questions regarding the regulations should be directed to the ministry's Waste Reduction Office in Toronto at (416) 325-4440, or to a Ministry of Environment and Energy Regional or District Office listed in Appendix A.

Copies of Regulation 102/94 are available from Publications Ontario at 1-800-668-9938 or 326-5300 in Toronto.

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PREFACE

This guide is one of a series to help waste generators, packagers, municipalities and recycling site operators understand and comply with the requirements of the 3Rs Regulations that became law March 3, 1994.

The regulations are an integral part of Ontario's Waste Reduction Action Plan, announced in February 1991 by the Minister of Environment and Energy. The plan is aimed at reducing the amount of waste going to disposal by at least 50 per cent by the year 2000 compared to the base year of 1987.

Ontario will achieve this goal with a strategy based on the 3Rs — reduction, reuse and recycling.

The 3Rs Regulations are designed to ensure that industrial, commercial and institutional (IC&I) sectors, as well as municipalities, develop programs to reduce the amount of valuable resources going to disposal.

The five new regulations, made under the *Environmental Protection Act*, are:

Ontario Regulation 101/94: Recycling and Composting of Municipal Waste

Ontario Regulation 102/94: Waste Audits and Waste Reduction Workplans

Ontario Regulation 103/94: Industrial, Commercial and Institutional Source Separation Programs

Ontario Regulation 104/94: Packaging Audits and Packaging Reduction Workplans

Ontario Regulation 105/94: Definitions (Amendments to Regulation 347)

This guide will help those undertaking construction or demolition projects comply with the requirements for conducting waste audits and preparing and implementing waste reduction workplans as required under Regulation 102/94. For a legal interpretation of requirements, refer to the Official Regulation.

The other guides in this series are:

- *A Guide to Source Separation of Recyclable Material and Leaf and Yard Waste Systems for Municipalities as Required under Ontario Regulation 101/94*
- *A Guide to Source Separation of Recyclable Material for Industrial, Commercial and Institutional Sectors and Multi-Unit Residential Buildings as Required under Ontario Regulation 103/94*
- *A Guide to Approvals for Recycling Sites, Leaf and Yard Waste Composting Sites and Compost Use as Required under Ontario Regulation 101/94*
- *A Guide to Waste Audits and Reduction Workplans for Industrial, Commercial and Institutional Sectors as Required under Ontario Regulation 102/94*
- *A Guide to Packaging Audits and Reduction Workplans as Required under Ontario Regulation 104/94*

Ontario's Waste Reduction Target

The Government of Ontario has established a target to decrease the amount of waste going to disposal by at least 50 per cent by the year 2000 compared to the base year of 1987. This is a *provincial* target that applies to the total amount of non-hazardous solid waste generated in Ontario from all sources. While this target is not a legal requirement for individual municipalities and IC&I establishments under the 3Rs Regulations, many have voluntarily adopted it, and some have set an even higher waste reduction target.

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1.0

INTRODUCTION

The 3Rs Regulations apply to all non-hazardous solid wastes from residential and industrial, commercial and institutional (IC&I) sources. This guide focuses on the requirements for waste audits and workplans specific to the construction and demolition industry.

The development and implementation of waste audits and waste reduction workplans by those construction and demolition projects designated under Regulation 102/94 will contribute significantly to the province's waste reduction goal.

IC&I wastes, including those generated by the construction and demolition industry, make up the largest component of the non-hazardous solid waste stream. Efforts in these sectors to reduce waste will, therefore, have the greatest potential for diverting materials away from disposal into productive use.

Waste audits and waste reduction workplans can also help reduce the residential waste stream. Changes in the manufacturing process, for example, identified by a waste audit, can lead to design changes in the product ultimately bought by consumers. The design changes may incorporate the 3Rs hierarchy by reducing material use and by making the product more reusable or recyclable.

Chapter 1.0 of this guide provides compliance deadlines for the completion of waste audits and workplans under Regulation 102/94. Chapter 2.0 describes the general requirements of a waste reduction program. Chapter 3.0 defines the construction and demolition projects that must implement a waste reduction program and any special provisions which apply to these projects.

The appendices list information sources for obtaining assistance on implementing a waste audit and reduction program and sample forms required for recording purposes. Appendix B contains information on a typical waste audit process and checklists for 3Rs activities which may be useful in preparing a waste reduction workplan.

1.1 Compliance Deadlines

Regulation 102/94 provides a six-month transition period for construction and demolition projects that began before the regulation came into force on March 3, 1994. The compliance rules for existing projects are as follows:

- Existing projects must comply before September 3, 1994, the end of the six-month transition period.
- Existing projects need not comply if all site work is completed before September 3, 1994.
- Existing projects still in operation after September 3, 1994 must conduct a waste audit but the audit needs to consider only waste generated after September 3, 1994.

Designated construction or demolition projects started after March 3, 1994 have until September 3, 1994 to complete a waste audit and a waste reduction workplan.

After September 3, 1994, designated construction and demolition projects must prepare a waste audit and reduction workplan before work begins at the site.

2.0

GENERAL REQUIREMENTS

A waste reduction program for construction and demolition projects required under Regulation 102/94 has three basic components:

1. Conducting a waste audit
2. Developing a waste reduction workplan
3. Implementing the workplan

This chapter outlines the requirements for these components and the reporting process.

2.1 Conducting a Waste Audit

A waste audit is essentially a study relating to waste generated by a project. A waste audit involves more than simply measuring or estimating the quantity and composition of waste that will be generated. It must also look at the underlying reasons for waste generation and the operational factors which contribute to the waste.

Under the regulation, all waste audits must address:

- the amount, nature and composition of the waste generated;
- how the waste is produced, including any management policies and practices that relate to the production of waste; and
- how the waste is managed.

Regulation 102/94 requires that the audit be completed before work is started at the site (see 1.1 for information on deadlines). This means that a waste audit for a project will need to be done in conjunction with, and based on, other planning activities related to the project.

2.2 Developing a Waste Reduction Workplan

The information resulting from the waste audit forms the basis for developing the waste reduction workplan. The workplan addresses 3Rs opportunities which will be pursued.

Regulation 102/94 requires that all completed waste reduction workplans must include all reasonable actions that can be taken. These actions must follow the 3Rs hierarchy, with reduction as the first priority, followed by reuse and then recycling.

2.3 Implementing a Waste Reduction Workplan

Regulation 102/94 requires that a workplan be developed before work starts at the site (see 1.1 for information on deadlines). The workplan must assign responsibilities and resources, and state expected results.

A workplan may be structured so that some actions are given a higher priority than others. A number of factors may need to be considered to determine which actions will contribute most to meeting waste reduction objectives.

2.4 Processing and Reporting Requirements

Those conducting a waste audit and preparing and implementing a waste reduction workplan must include several features which document the process and results.

The requirements described below apply to *all* designated projects. Additional provisions which apply to either construction or demolition projects are described in Chapter 3.0.

- A waste reduction workplan must set out who will implement each part of the plan, when each part will be implemented and what the expected results are.
- A waste audit and waste reduction workplan must be documented in written reports.
- A report of a waste audit or a waste reduction workplan must be on a form provided by the ministry or follow the same format. A sample form and instructions are included at the end of this guide; additional forms are available from the ministry's Regional and District Offices. In most cases, a waste audit or waste reduction workplan will include much more extensive documentation than the summary information required on these forms.
- A report of a waste audit or a waste reduction workplan must be retained on file for at least five years.
- A waste reduction workplan must deal with the wastes that will be generated in the designated project.
- The waste reduction workplan or a summary of the workplan must be posted in places where workers at the site will see it. Workers must be allowed to see the workplan on request.
- The person responsible for the designated project must submit the audit and workplan to a ministry Director within seven days if requested.

3.0

WHO IS AFFECTED / SPECIAL PROVISIONS

The requirement to prepare waste audits and waste reduction workplans applies only to persons who are designated in the regulation. All associated administrative, warehousing, or other ancillary activities/departments located on site are considered to be included.

Building floor area is the criteria used to designate construction and demolition projects. It is to be calculated as gross area according to the *Ontario Building Code*. Gross area, as defined in the Code, means “the total area of all floors above grade measured between the outside surfaces of exterior walls or between the outside surfaces of exterior walls and the centre line of firewalls except that, in any other occupancy than a residential occupancy, where an access or a building service penetrates a firewall, measurements shall not be taken to the centre line of such firewall.”

The area should be calculated as the total area of the building. This is the area normally reported on Building Permits. Multi-story or underground parking lot areas must be included in the total building area. However, any outside areas such as ground-level outdoor parking lots or recreation parks are not part of the total area. For example, an apartment complex project consists of three buildings, with areas of 800, 500 and 600 m², and an outdoor ground level parking lot of 1,000 m². The sum of the three building areas — 1,900 m² — would be the total area of the project and, therefore, it would not need to comply with the regulation.

A project includes the operations normally associated with the construction or demolition of buildings. Types of projects include construction or demolition of residential, commercial, industrial or institutional buildings such as single family housing, apartments, offices, factories or hospitals. Renovation projects are not designated under the regulation.

3.1 Construction Projects

A “construction project” is designated if it consists of the construction of one or more buildings with a total floor area of at least 2,000 square metres.

The waste audit must address the extent to which materials or products used by the builder consist of recycled or reused materials or products.

3.2 Demolition Projects

A “demolition project” is designated if it consists of the demolition of one or more buildings with a total floor area of at least 2,000 square metres.

All projects designated by Regulation 102/94 are also required to establish a source separation program under Regulation 103/94. See *A Guide to Source Separation of Recyclable Materials for Industrial, Commercial and Institutional Sectors and Multi-Unit Residential Buildings*.

APPENDIX A

Ministry of Environment and Energy – Regional and District Offices

Central Region

Halton - Peel District Office
1235 Trafalgar Road, #401
Oakville, ON L6H 3P1
Tel. #: (905) 844-5747
Fax #: (905) 842-1750

Toronto Regional and York -
Durham District Offices
7 Overlea Blvd., 4th Floor
Toronto, ON M4H 1A8
Tel. #: (416) 424-3000
Fax #: (416) 325-6345

West Central

Cambridge District Office
P.O. Box 219
320 Pinebush Road
Cambridge, ON N1R 5T8
Tel. #: (519) 622-8121
Fax #: (519) 622-3119

Hamilton District Office
Box 2112
119 King St. West, 12th floor
Hamilton, ON L8N 3Z9
Tel. #: (905) 521-7650
Fax #: (905) 521-7806

Welland District Office
637-641 Niagara Street North
Welland, ON L3C 1L9
Tel. #: (905) 384-9845
Fax #: (905) 735-0574

Mid-Ontario Region

Barrie District Office
54 Cedar Point Drive, Unit 1203
Barrie, ON L4N 5R7
Tel. #: (705) 726-1730
Fax #: (705) 726-5100

Muskoka Haliburton District Office
483 Bethune Drive
Gravenhurst, ON P0C 1G0
Tel. #: (705) 687-6647
Fax #: (705) 687-3715

North Bay District Office
Northgate Plaza
1500 Fisher Street
North Bay, ON P1B 2H3
Tel. #: (705) 476-1001
Fax #: (705) 476-0207

Sudbury District Office
199 Larch Street, 11th Floor
Sudbury, ON P3E 5P9
Tel. #: (705) 675-4501
Fax #: (705) 675-4180

Southeastern Region

Belleville District Office
470 Dundas Street East
Belleville, ON K6H 1C1
Tel. #: (613) 962-9208
Fax #: (613) 962-6809

Cornwall District Office
205 Amelia Street
Cornwall, ON K6H 3P3
Tel. #: (613) 933-7402
Fax #: (613) 933-6402

Kingston District Office
133 Dalton Street
Kingston, ON K7K 6C2
Tel. #: (613) 549-4000
Fax #: (613) 548-6920

Ottawa District Office
2435 Holly Lane
Ottawa, ON K1V 7P2
Tel. #: (613) 521-3450
Fax #: (613) 521-5437

Peterborough District Office
1477 Lansdowne Street West
Peterborough, ON K9J 7M3
Tel. #: (705) 743-2972
Fax #: (705) 748-4192

Southwestern Region

London Regional Office
985 Adelaide Street South
London, ON N6E 1V3
Tel. #: (519) 661-2200
Fax #: (519) 661-1742

Owen Sound District Office
1180 - 20th Street East
Owen Sound, ON N4K 6H6
Tel. #: (519) 371-2901
Fax #: (519) 371-2905

Sarnia Area Office
265 Front Street North, #109
Sarnia, ON N7T 7X1
Tel. #: (519) 336-4030
Fax #: (519) 336-4280

Windsor District Office
250 Windsor Avenue, 6th floor
Windsor, ON N6A 6V9
Tel. #: (519) 254-2546
Fax #: (519) 254-5894

Northern Region

Kenora District Office
P.O. Box 5150
808 Robertson Street
Kenora, ON P9N 1X9
Tel. #: (807) 468-2718
Fax #: (807) 468-2735

Sault Ste. Marie District Office
747 Queen Street
Sault Ste. Marie, ON P6A 2A8
Tel. #: (705) 949-4640
Fax #: (705) 945-6868

Thunder Bay Regional Office
P.O. Box 5000
435 James Street South, 3rd Floor
Thunder Bay, ON P7C 5G6
Tel. #: (807) 475-1205
Fax #: (807) 475-1754

Timmins District Office
83 Algonquin Blvd. West
Timmins, ON P4N 2R4
Tel. #: (705) 268-3222
Fax #: (705) 264-7336

APPENDIX B:

A TYPICAL WASTE REDUCTION PROGRAM

Getting Started

Ideally, your waste audit/reduction workplan program should be managed by a person who is interested in resource conservation and has sound knowledge and experience of your company's operations. An effective Waste Reduction Coordinator will have the greatest impact when fully involved in all aspects of the waste audit and reduction workplan program.

For larger projects, you may wish to form a Waste Reduction Committee to set up and maintain your waste reduction program. The committee could consist of the coordinator, owner, general contractor and site supervisor, representatives of various sub-trades and a waste hauler. This will allow you to generate ideas collectively and ensure that the program is designed to provide opportunities for everyone to participate. Also, by spreading information outwards, it builds a stronger awareness of your waste reduction plans.

Examples of what role(s) the coordinator/committee could play to successfully undertake a waste audit and to implement a waste reduction workplan include the following:

- identifying and interpreting government requirements and regulations;
- securing senior management support;
- conducting and/or overseeing the waste audit;
- establishing the waste reduction goals;
- identifying funding requirements and the costs and benefits of the program;
- developing a 3Rs program and implementation schedule;
- monitoring the waste reduction, reuse, and recycling activities;
- promoting and communicating waste reduction activities.

Communicating Project Objectives

Before initiating a waste audit or reduction workplan, you should inform everyone involved of the objectives of the program and the importance of their cooperation. Sub-trades should be informed also. They will need to work cooperatively to characterize and measure waste streams and effectively implement waste reduction measures.

CONDUCTING A WASTE AUDIT

Introduction

An important factor in planning your waste audit is the level of audit detail you choose to use. The level of detail depends upon the size of the project, complexity of operations, and accuracy you require for your reduction workplan.

The following waste audit process is one approach that will provide you with enough information to proceed with your waste reduction workplan and to meet the requirements of the Ministry of Environment and Energy. This approach is intended to identify the major wastes and to provide a starting point for your waste diversion initiatives. Figure 1, Waste Audit Flowchart, provides an overview of the audit process. More detailed “how to” information sources are listed in Appendix C.

Step 1: Assemble Basic Information

Review Operations

You should review and record the following basic information about your construction or demolition project:

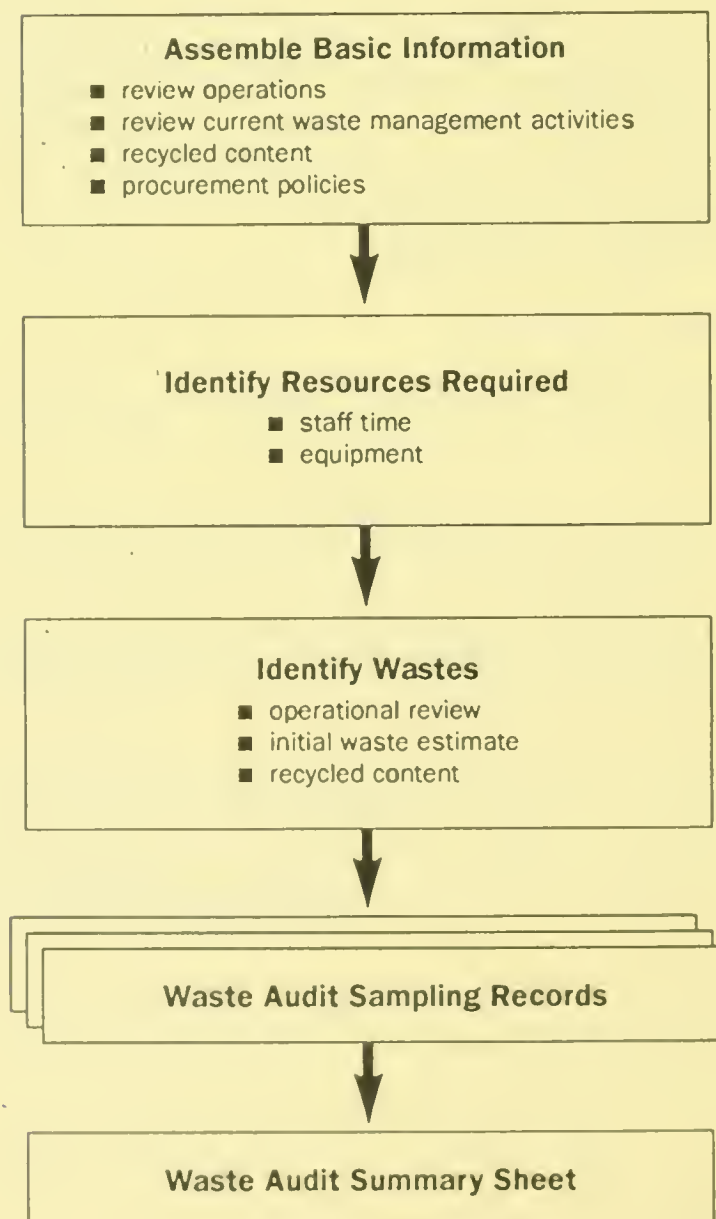
-
- building floor area or other indicators relevant to your projects;
 - type and size of construction or demolition project;
 - location;
 - stages of project, e.g. excavation, structural, interior finishing;
 - stages of the project that are sub-contracted to trades; and
 - purchasing policies.
-

It is also important to review all areas of your project so that you will not miss future opportunities for waste reduction. The scope of the review will include the traditional waste generation areas. This level of review, with waste reduction in mind, often leads to significant opportunities.

Here are the minimum points to review:

-
- composition and quantity of all wastes directly generated within the project through all normal activities;
 - the extent to which materials or products used consist of recycled or reused materials or products;
 - the manner by which the waste is generated including management decisions and policies that relate to the production of waste; and
 - the way in which the waste is managed.
-

Figure 1: Waste Audit Flowchart



Review Existing Waste Reduction and Disposal Activities

At this early point in the audit program, you should also review your current waste management activities. The review will provide start-up information for your waste audit and for later efforts in waste reduction planning.

Basic questions to be asked relate to:

-
- waste separation and recycling activities;
 - timing and frequency of waste collections;
 - methods of waste collection to be employed, including internal and external waste handling;
 - quantities of waste and recyclables to be collected;
 - waste collection contractor/recycling service contractor;
 - person responsible for waste management/reduction;
 - responsibilities of sub-trades for their own waste disposal;
 - gross costs of waste collection and disposal; and
 - obtain an up-to-date list of recycling facilities and capabilities in your area.
-

Step 2: Identify Wastes

The objective of this step is to estimate types of wastes and places where they will be generated. During the review, you should note collection and storage practices and any other special considerations that should be taken into account later when you develop your waste reduction workplan.

It is your responsibility to ensure that the information that appears in the audit reflects the waste which will be generated by your project.

Sources of information may include:

-
- engineering estimates;
 - material purchasing records;
 - waste disposal invoices for similar projects;
 - records of waste produced at generation points in daily operations of other projects; and
 - studies of similar projects.
-

You can identify your wastes by:

- Estimating wastes generated through each stage of a project based on building construction and demolition methods, materials and efficiencies. Staff and sub-trades may be required to submit information to the coordinator for summary.
 - Conducting a walk-through review of operations on similar projects to ensure that all waste streams have been identified. Look inside waste containers, and, above all, ask questions.
-

Classify your wastes as follows:

- materials that the Ministry of Environment and Energy will require you to source separate for recycling (see *A Guide to Source Separation of Recyclable Material for Industrial, Commercial and Institutional Sectors and Multi-Unit Residential Buildings*);
 - other materials identified within your project that could be source-separated for reuse or recycling;
 - residual material which would go for disposal.
-

Figure 2, Waste Sampling Record, may be used to summarize the results of this step.

Step 3: Identify Recycled Content of Building Materials

Up to this point, you will have assessed the composition, volumes, and weights of wastes generated on a project. This step requires you to examine the current reduction activities at the front end of your operations.

You should now examine purchasing specifications to identify the recycled content of purchased building products, and raw materials. This will be useful for determining whether you can take steps to increase use of items with higher recycled content.

It will not be necessary to examine 100 per cent of your incoming materials. A common approach is to combine the individual purchases of similar materials and to list them in descending order of purchase value. It is usually found that the first 20 per cent or so of the listed materials account for 80 per cent or more of the total purchase value (and potential waste). This means that you may need to examine only 20 per cent of the material types concerned to obtain most of the information you need.

Figure 2: C&D Waste Sampling Record

Location: Number 3 Office Tower - 2000 One Street			Date: October, 1994	
Sample Taken: Portion of Demolition Phase			Time Period: October to Dec 1994	
Operation Characteristics: Nothing unusual				
Material	Characteristics	Volume *	Weight (tonnes)	% of Total ** Sample
Wood	off cuts, warped pallet forms	60 cu yd	9	16%
Concrete + Masonry	Rubble from concrete + brick	120 cu yd	40	71
Plaster		30 cu yd	4	7
Cardboard	Packaging	2 cu yd	.25	.4
Drywall	Clean drywall	2 cu yd	.25	.4
Misc.		64 cu yd	3	5.3
Totals		278 cu yd.	56.5	100 %

* Please note if you measure your waste by volume, you must convert these figures to weights, See Appendix D for Conversion Table.

** If using purchasing records, calculation of % is not applicable.

Looking at the major material purchases, you can quickly review the recycled content of each material. Approach your supplier immediately if the information needed is not readily available.

Step 4: Complete Waste Audit Summary Sheet

You should maintain a record of the information reviewed, assumptions made, waste samples examined (including the sample dates) and the material weights and/or volumes calculated.

You are now ready to complete the Waste Audit Summary, Figure 3, as required by the Ministry of Environment and Energy under the regulation. A blank audit report form is provided at the end of this guide. If you wish you may use your own forms as long as their formats are similar to those provided here.

To determine if you've met your waste reduction goals, you may wish to relate waste generation to a specific indicator, so that changes in production or activity can be accounted for. For example, the size of each project will likely change from one project to the next. By calculating the total waste generated per unit floor area of the project, comparing this factor with those of other projects, you might observe whether a change in overall waste generation is due to project size, type or other factor.

Figure 3:

Waste Audit Summary
Construction and Demolition Projects
As required by Ontario Regulation 102

Name of company Number 3 Office Tower	Name of contact person Joe Wastman	Telephone No. (123) 456-7890
Project site/location (if applicable) 2000 One Street, Downtown, Ontario	ABC 123	Date of audit October 1, 1994
<input type="checkbox"/> Construction project <input checked="" type="checkbox"/> Demolition Project		
Square metres		Square metres 2,750 sq. m.

Material category	Waste generated (tonnes)	Reused material (tonnes)	Recycled material (tonnes)
Wood	1125	76	5.5
Concrete & Masonry	5000	30	2005
Metal	94		70
Plaster	500		
Roofing	250		
Cardboard	31	22	
Plastic	12.5	2	
Brickwall	31	7.5	23
Total	7043.5	137.5	2103.5

Materials (bought/sold) that contain recycled content	
Material	Percentage of recycled content
Cardboard	20 %
Plastic	13 %

I hereby certify that the information provided is complete and correct, and the establishment complies with all the requirements of Regulation 102.

Signature of authorized official J. Wastman	Title Recycling Co-ordinator	Date Oct. 30/94
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CREATING A WASTE REDUCTION WORKPLAN

Introduction

In the waste audit process you have been studying the waste generated in your project and learning more about your waste management policies and operations. Now you are ready to take action aimed at further waste reduction. Figure 4 gives an overview of an acceptable process for creating the waste reduction workplan.

Step 1: Review Current 3Rs Activities

To begin the process, review your Waste Audit Summary Sheet and assemble information relating to 3Rs actions currently in place, including:

-
- waste reduction policies;
 - current waste reduction, reuse, recycling and disposal activities;
 - types and quantities of materials in each activity;
 - achievement of current waste reduction targets;
 - operating cost impacts as a result of 3Rs activities.
-

Step 2: Identify Areas of Greatest Waste Reduction Impact

A key factor in finding 3Rs opportunities for waste reduction involves examining those materials that make up a large part of the waste produced, usually by weight or volume. Such a move to organize your waste audit data will highlight areas where your reduction efforts will have the greatest impact. Waste audit data can be organized in different ways by:

-
- weight or volume;
 - disposal cost;
 - potential for source separation;
 - potential to reduce, reuse or recycle;
 - complexity of handling;
 - current and potential regulatory requirements.
-

Figure 4: Waste Reduction Workplan Summary

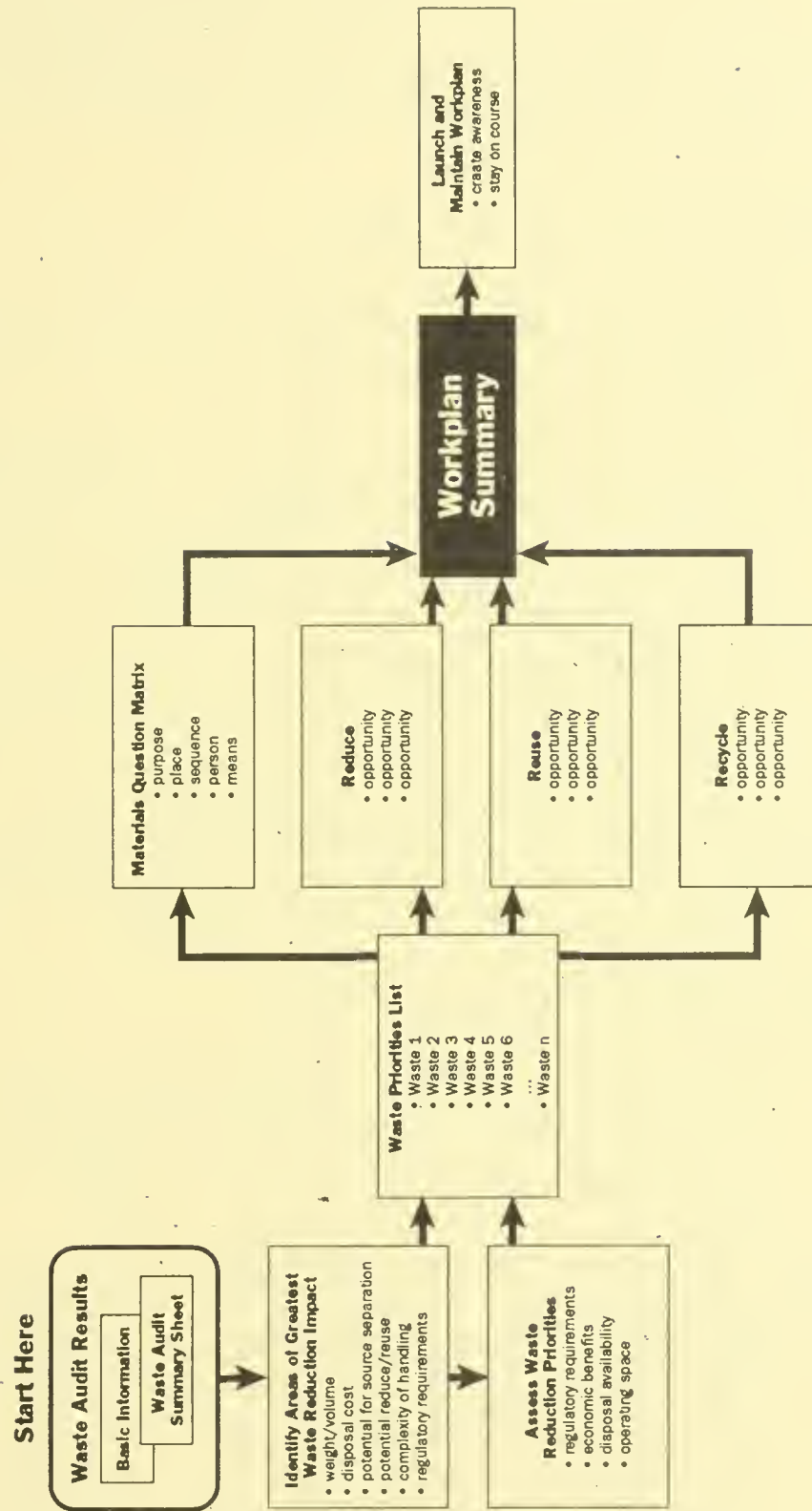


Figure 5 shows typical ways to summarize your waste material rankings.

You should also consider issues you may face in implementing 3Rs programs, including the following: health and safety regulations; storage space at your project; availability of recycling markets and collection services; and operating costs.

Step 3: Assess Waste Reduction Priorities

After identifying general areas for potential waste reduction, you should look at the possible impact of other priorities on your 3Rs options. At this point in your workplan development, you should consider at least the following items:

-
- **Current and potential regulatory requirements:** Check items for reduction, reuse, and recycling limitations (e.g., restrictions on wastes that may be considered “contaminated”).
 - **Economic benefits:** Review the costs and benefits of each waste reduction opportunity.
 - **Continuing disposal availability:** Be aware of planned or anticipated landfill closures or other disposal limitations that may affect your waste materials.
 - **Changing operating space constraints:** Availability of on-site storage space may not continue in the longer term.
-

Any other priority influences that relate specifically to your projects should be factored into your waste reduction decisions.

Step 4: Determine Why Waste Is Generated

In assessing your waste reduction options, you should ask the following basic question at the start: “Why is this material being used?” Questions such as this can stimulate thought and help you develop many other ways of dealing with the material under review. A list of suggested questions is below:

Purpose	Why is the material being used?	What else could be used?	What should be used ?
Place	Where is it used?	Where else could it be used?	Where should it be used?
Sequence	When is it used?	When could it be used elsewhere?	When should it be used?
Person	Who uses it?	Who else could use it?	Who should use it?
Means	How is it used?	How else could it be used?	How should it be used?

Figure 5: C&D Organized Waste Audit Data

Waste Material Type	Volume (cu.metre)	Weight (tonne)	Waste Costs
Wood	60	9	\$ 110 00
Concrete + Masonry	120	40	40 00
Cardboard	2	.25	25 00
Drywall	2	.25	75.00
Roofing Materials	25	2	150 00
Metal	10	.75	Potential Revenue

Ranking by volume		Ranking by Weight		Ranking by waste cost	
Material Type	Volume (cu.m)	Material Type	Weight (tonnes)	Material Type	Cost \$/tonne
Concrete	120	Concrete	40	Metal	Potential Revenue
Wood	60	Wood	9	Cardboard	\$ 25.00
Roofing	25	Roofing	2	Concrete	40 00
Metal	10	Metal	.75	Drywall	75.00
Cardboard	2	Cardboard	.25	Wood	110.00
Drywall	2	Drywall	.25	Roofing	150.00

Answers to these questions may show the way to various options for reducing, reusing, and/or recycling your wastes, including:

-
- where waste can be reduced by eliminating the use of certain product materials;
 - where other materials can be used that, in turn, can be reused or recycled;
 - where less wasteful materials can be used;
 - where less material can be purchased (e.g. buying in bulk versus individually wrapped items);
 - where previously recycled materials can be used;
 - where controls can be set up to reduce waste generation during your operations.
-

Step 5: Identify Opportunities for Reducing, Reusing and Recycling Wastes

By now you will be focused on specific materials in terms of waste reduction opportunities and priorities. Achievement of your waste reduction goals will usually involve the cumulative effect of a number of 3Rs initiatives. This section outlines some 3Rs opportunities which are in common use. Your own situation may differ, however, and not all these possibilities will apply. In many cases the ideas are very simple yet these can often lead to more significant initiatives.

Reducing Wastes

Workers on your project may already use various methods to reduce the quantity of waste being generated. For example, you may already have replaced some disposable products with either reusable products or disposable products which can be recycled.

You should take a similar approach for each of the materials you use to support and maintain your construction/demolition projects. Focus on reducing the quantities of disposable supplies and equipment used, and on improving purchasing policies to reduce the amount of incoming packaging. You could also increase your controls over the quantities of material consumed (e.g., to reduce the amount of drywall used in your project).

State expectations in trade contracts. Expectations regarding material supply, site cleanup, and compliance with waste reduction initiatives should be clearly stated in tendering and contract documents. Establish contracts with trades to supply both labour and materials. If trades supply materials, they will be fully committed regarding usage. Alternatively, establish policies that require contractors to remove and divert waste materials from disposal.

Produce more efficient construction designs where possible. Reducing material wastage begins at the design stage. Designers, architects, and builders should evaluate their plans for efficiency of material usage (e.g., consider standardizing room sizes and minimizing off-cuts).

Use more prefabricated products. Less waste may be generated on-site if more prefabricated or pre-cut products such as floor joists, trusses, and truss-joints are used.

Purchase selected materials in bulk containers. Purchase materials such as fasteners, paint, caulking and drywall mud in bulk containers. Stored in such containers, they are not as vulnerable to weather damage.

Reduce neighbourhood contamination. Neighbourhood contamination is a common occurrence and creates many problems. Protect waste bins and piles by covering them, securing them with locks and locating them in well-lit areas. Signs stating the company's commitment to waste reduction and dumping restrictions should be posted on-site and on bins.

Reusing Wastes

A reuse strategy to avoid waste is common on construction sites. Forms for pouring foundations, scaffolding and other systems all lead to less waste. Also consider using wastes from one application on other projects. For example, aluminum sheet offcuts from one job may provide the raw material input to another, smaller job. In your own operations, you may already reuse certain materials. But, there may be others who can make beneficial use of your waste. This option can also help reduce your disposal costs.

Remove items carefully during demolition. Disassemble items carefully during demolition to minimize damage and salvage for reuse as many items as possible. Selected residual components of construction are often relatively simple to remove for reuse and will continue to have a useful lifespan.

Invite the public to reuse materials. Conduct a “strip-out sale” or advertise that certain items are free-for-the-taking by the public once they are removed from the building. Items of interest to the public may include bundles of wood off-cuts, doors, windows, decorative mouldings, cabinets, plumbing and electrical fixtures and older appliances. Consider sending materials to salvage yards for future reuse.

Collect and store reusables. Space permitting, warehouse your unused materials and salvaged items for future use or re-assembly in another project. If not, direct your reusables to your local “reuse” facility. Join other companies to collect, re-distribute, and reuse waste materials. For example, excess brick from one or several projects can be reused as part of a fireplace or chimney on another project.

Explore availability of “Off-Spec” products. Where appropriate consider using “off-spec” products such as for stairs, windows, and doors.

Reuse Items On-Site for Different Purposes. Many items have reuse potential on the job site. Reuse lumber off-cuts as bridging, blocking, or forming stakes. Recover plastic vapour barrier and wrappings and reuse as protection for tools and materials when not in use. Use cardboard boxes for temporarily storing small quantities of recyclables. Excess insulation from exterior walls can be added to interior walls or attics.

Recycling Wastes

Most construction/demolition projects can take advantage of opportunities for external recycling of wastes. Markets exist for many recyclable materials such as: steel, aluminum, corrugated cardboard, wood, drywall, concrete and glass. Other materials, such as roofing materials and fibreglass insulation, may be added to your recycling list, as the markets develop.

The economics of recycling will vary with the material. For some materials you will receive direct revenue. For others, the cost of recycling may simply be less than the cost of landfill tipping fees.

Establish a recycling program. The Ministry requires that the construction and demolition projects identified in this guide have a recycling program in place. See *A Guide to Source Separation of Recyclable Materials for the Industrial, Commercial and Institutional Sectors*.

Source Separate Recyclables. Several alternatives exist to source separate recyclables. Several recycling containers and bins should be provided on every site to facilitate source separation.

Provide Adequate Training. Workers should be provided with training in source separation techniques and supplied with adequate means to perform this task efficiently.

Back-charge trades. Consider back-charging trades for the waste they generate and the additional labour hours the general contractor takes to clean it up. Workers could be instructed to record the amount of time spent to clean up each trade's waste throughout the day.

Investigate waste handling techniques and equipment. Waste handling techniques and equipment such as split-bins and split-chutes are available. They can be useful on small sites as they help to maximize use of space.

Step 6: Assess Impact of Material Purchasing on Waste Reduction

Many of your waste reduction opportunities will involve your material purchasing practices. In some cases, you may develop a purchasing policy to buy materials that already have a recycled content. This action has the added benefit of improving the overall market for recycled materials.

Actions to change the material used in construction may involve discussions with your suppliers. For other products, you can work with your supplier to provide you with more "environmentally sound" materials. Replacing non-recyclable materials with reusable or recyclable materials gives economic benefits as well as greater waste diversion.

Another important waste reduction action with suppliers involves reducing packaging and containers. Many companies, as part of their purchasing and materials management policies, set up distribution systems with their suppliers to use returnable transportation/storage containers. Working with suppliers, you can eliminate many of the inspection and interim storage processes that require higher material/packaging volumes and the associated administrative paperwork.

On a general basis, you should also review the materials and products currently purchased from your supplier to ensure optimum “environmental friendliness”. This will increase your level of reliance on your suppliers to advise your company on the availability of previously recycled or more easily recyclable materials for your own use.

Step 7: Complete an Achievable Waste Reduction Workplan

Your waste reduction workplan is a compilation of the waste reduction opportunities you have identified and the actions you intend to take in reducing your wastes. At this stage you should also set waste reduction targets. The provincial target is at least 50 per cent reduction by 2000. Ideally, you should be attempting to meet if not exceed this target.

Try to set realistic reduction targets; it is important that your workplan is achievable.

Your targets will form the basis for waste reduction actions for each waste material. These decisions reflect the benefits of accurate waste audit information. Missed targets could have negative impacts on your workers attitudes and confidence in future waste reduction workplans.

Figure 6 shows a completed Waste Reduction Workplan Summary. This format is designed to complement the Waste Audit Summary Report. The workplan focuses on the wastes for which reduction actions have been identified and reduction targets set. The format allows actions on separate waste materials to be identified as well as the total amounts of waste reduced, reused, and/or recycled.

The Waste Reduction Workplan Summary is a two part form with the general company information at the top and the materials, actions, 3Rs and dates in the next section. You may find that you need to complete a few of these workplan summaries, should you have a large list of actions. We have provided a blank form at the end of this guide.

Waste Reduction Workplan Summary

As required by Ontario Regulation 102

<input type="checkbox"/> Industrial, commercial and institutional establishments <input checked="" type="checkbox"/> Construction and demolition projects	For period October 1994 to December 1994
--	---

Shaded areas are for Industrial, Commercial and Institutional Establishments use only.

Name of company

Name of contact person

Telephone No. _____

94

Number 3 Office Tower

Joe Wastman

(123) 456-7890

Project site/location

Total waste disposal last year

2000 One Street, Downtown, Ontario ABC 123

ABC 123

tonnes

[illegible]

I hereby certify that the information provided is complete and correct, and the establishment complies with all the requirements of Regulation 102.

Signature of authorized official

Title

Date _____

J. Wastner

Recycling Coordinator

Oct/94

LAUNCHING THE WORKPLAN

Creating Awareness

Launching your reduction workplan needs several important actions to ensure success.

Your Waste Reduction Coordinator/Committee should be clear about the goals and objectives of the workplan. They should assign responsibilities and authorities to appropriate personnel in all project areas.

It is essential to make the right resources available. This may involve staff time to manage and operate your workplan and basic equipment to contain wastes. Consultation with end users or recycling service providers will help you identify what equipment is needed.

At the same time, your coordinator/committee should develop awareness of your workplan among all staff and workers. Open display of the workplan, as required by the Regulation, and explanation of its goals will help secure full participation.

Please note that the workplan must also be communicated to outside trades who come to work on the project. In these cases a short summary of the waste reduction workplan can be handed out, with ongoing operational directions and showing the locations of recycling bins.

Generate enthusiasm! Be imaginative, create incentives and share the results of your program so that everyone will keep up their support.

Staying on Course

To ensure success, you should monitor waste reduction performance against the targets established. You may find that additional waste reduction opportunities will arise, or find that more action is needed or different methods become available. You may need to adjust operating procedures and amend reduction targets, ideally upwards.

Current systems being developed for most projects show that it is possible to achieve sizable reductions in wastes. The coordinated efforts of all your employees can provide substantial benefits to your own operations and to the environment.

You might compare the performance of similar projects to check your reduction achievements against your targets. You can then make changes to your waste diversion targets and planned actions.

APPENDIX C

Additional Sources of Information

What to do with home renovation waste

Ontario Ministry of Environment and Energy

1-800-565-4923 (Toronto: 323-4321) or Fax (416) 323-4564

This pamphlet outlines ways to practise the 3Rs when renovating, and recommends what to do with specific materials.

Keeping C&D Materials Out of Landfills

*Conserving Resources and Minimizing Waste
in the Construction Industry*

Ontario Ministry of Environment and Energy

1-800-565-4923 (Toronto: 323-4321) or Fax (416) 323-4564

This report summarizes the current solid waste management and waste diversion activities practised by the construction industry in Ontario. It identifies the barriers to greater diversion, and describes proposed action plans that would address these barriers, reduce waste generation and optimize diversion. The report was developed by the C&D Waste Reduction Strategy Team, a stakeholder group comprised of members of the construction industry, recycling associations, municipal and provincial agencies, labour and public interest groups.

Making a Molehill out of a Mountain II

Implementing the 3Rs in Residential Construction

Greater Toronto Home Builders Association

(613) 748-2367 or Fax (613) 748-4069

This booklet, aimed at the building industry, centres around three primary concepts: reducing waste at the source; reusing what would normally be landfilled; and recycling materials for which there is no immediate reuse. It helps contractors perform waste audits and then develop plans of action.

3Rs Code of Practice

Ontario Ministry of Environment and Energy

1-800-565-4923 (Toronto: 323-4321) or Fax (416) 323-4564

Developed by the Ontario construction industry in consultation with the ministry, the Code of Practice encourages implementation of a series of 3Rs principles.

Construction and the Environment: How Home Building and Renovators Can Help Build a Green Future

Canada Mortgage and Housing Corporation

(613) 748-2157

Describes the problems involved in disposing of residential construction waste and describes how to set up a waste management plan. Offers specific suggestions for reducing, reusing and recycling common building materials. Describes how to help protect the environment through the use of materials, fixtures and systems that permit waste and energy conservation.

Waste Management Action Plan for the Construction Industry

Greater Toronto Home Builders Association

(613) 748-2367 or Fax (613) 748-4069

Offers step-by-step instructions for setting up a waste management action plan, including how to estimate waste production, investigate disposal options, encourage workers to get involved, and develop a strategy for each phase of construction.

Waste Minimization

Construction and demolition industry fact sheet

Alberta Environmental Protection /

Alberta Special Waste Management Corporation

(403) 427-5838 or 1-800-278-8873

A fact sheet on the benefits of waste minimization, implementing a waste minimization program, and alternatives.

APPENDIX D: CONVERSION FACTORS

Metric Conversions

1 Tonne	=	1000 Kilograms	=	2200 lb
1 Kilogram(kg)	=	2.2 pounds (lb)		
1 Cubic Metre(m ³)	=	1.3 cubic yards	=	35.3 ft ³

Typical Container Sizes

Cubic Yard		Cubic Metre
4	=	3.1
6	=	4.6
8	=	6.2
14	=	10.7
20	=	15.4
40	=	30.8

Typical Weights

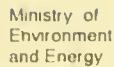
Pallet - Softwood	20lb/9kg
Pallet - Hardwood	30lb/13.6kg
Pallet - 1 cu. yd.	45kg*
	91kg#
Drum - Steel, top	40lb/18kg
Drum - Steel	35lb/16kg
Drum - Fibre, top	20lb/9kg
Drum - Fibre	15lb/5.5kg
Drum - Plastic, top	35lb/16kg
Drum - Plastic	30lb/14kg

Example Densities

Material	Uncompacted (kg/m ³)	Compacted (kg/m ³)
Asphalt (milled, ripped)	800-1000	
Concrete, Brick & Block	1200-2372	
Mixed Demolition, noncombust	1000-1600	
Mixed Demolition, combustible	300-400	
Odd Plastic	30	416
Glass	300-357	595-1189
Corrugated Container	24-27	241-342
Wood:		
pallets (c&d)	170	
dimensional lumber (c&d)	145	
sawdust/shavings	288-241	
trimmings	577	
crates	108	
Metal Scrap:		
heavy	2408	
light	803	
Mixed Residential Waste	150-300	

* uncompacted

compacted



As required by Ontario Regulation 102

Name of company	Name of contact person	Telephone No.
Project site/location (if applicable)		Date of audit
Type of project <input type="checkbox"/> Construction project <input type="text" value="Square metres"/> <input type="checkbox"/> Demolition Project <input type="text" value="Square metres"/>		

Material category	Waste generated (tonnes)	Reused material (tonnes)	Recycled material (tonnes)
Total			

Materials (bought/sold) that contain recycled content	
Material	Percentage of recycled content

I hereby certify that the information provided is complete and correct, and the establishment complies with all the requirements of Regulation 102.

Signature of authorized official	Title	Date
----------------------------------	-------	------

WASTE AUDIT SUMMARY INSTRUCTIONS
Construction and Demolition Projects

Name of Company, Project Site/Location (if applicable), and Telephone No. - write the name of your company or institution, the telephone number, and the address of the project site in the spaces provided.

Type of establishment - put a cross in the box next to the type of establishment which is most appropriate, and in the box on the other side, write how your establishment fulfills the given criterion (ie. the floor size of the project).

Material category - write down the type of material used or handled (eg. concrete, drywall, brick, etc...).

Waste Generated, Reused material, and Recycled material - in these columns, put in the weight in tonnes for each of the materials you listed for your project. Waste generated means the total waste generated including waste later reused or recycled. Reused material means waste generated which was reused; recycled material means waste generated that was recycled.

Have an authorized official of your company sign and date this summary, stating his or her title.

Waste Reduction Workplan Summary

As required by Ontario Regulation 102

Shaded areas are for Industrial, Commercial and Institutional Establishments use only.

<input type="checkbox"/> Industrial, commercial and institutional establishments <input type="checkbox"/> Construction and demolition projects	For period _____ to _____ Year _____
---	--------------------------------------

Name of company	Name of contact person	Telephona No.
Project site/location		Total waste disposal last year
		tonnes

[illegible]

I hereby certify that the information provided is complete and correct, and the establishment complies with all the requirements of Regulation 102.

Signature of authorized official

Title

Date

WASTE REDUCTION WORKPLAN SUMMARY INSTRUCTIONS

In the first section, put a cross in the one box which is most applicable to your company or establishment. Write the period for which the workplan will be in effect.

Name of Company, Project site/location (if applicable), and Telephone No.: write the name of your company or institution, telephone number, and the address of the company or project site in the spaces provided.

Total waste disposal last year - total waste generated in the year previous to the workplan, minus total waste reused and total waste recycled (if any) for that period. Please ensure all figures are in tonnes.

Material category - write down the type of waste material (eg. fine paper, glass beverage bottles, newspaper, concrete, drywall, brick, etc...), and its weight in tonnes. **Proposed Action to Divert Materials** - fill in what action you intend to take to minimize the amount of this material that ends up as waste disposed. Specify this in the next three columns (**Reduction, Reused, Recycled**).

Shaded areas are for industrial, commercial and institutional establishments use only construction or demolition projects do not have to complete these sections.

Have an authorized official of your company sign and date this summary, stating his or her title.

1. Introduction

1.1 Background

The National Task Force on Packaging was established by the Canadian Council of Ministers of the Environment (CCME) in 1989, to develop a National Packaging Policy for Canada within the context of a much broader total waste management strategy. The result was the **National Packaging Protocol (NAPP)**, which was formally adopted by CCME in March 1990.

The Protocol outlines six fundamental policy statements aimed at minimizing the environmental effects of packaging and reducing packaging waste generation in Canada by 50% by the year 2000, relative to a base year of 1988. A 20% reduction by December 31, 1992 and a 35% reduction by December 31, 1996 have also been established as interim targets.

The goals and objectives of the Protocol apply to all packaging consumed in Canada, regardless of its origin. In addition to these national goals, specific targets will be established for industry sectors. The goals will be achieved through promoting and applying the principles of source reduction, reuse, and recycling (Three Rs). It should be understood that there is a hierarchy within the Three Rs. Source reduction is the preferred option followed by reuse and then recycling.

It is recognized that certain essential functions of packaging may limit opportunities for reducing packaging waste. These include the need to protect the health and safety of consumers, to meet language requirements and provide information about the product, and to maintain the integrity of the product.

Under no circumstances should these essential functions of packaging be compromised for packaging waste diversion objectives.

1.2 Purpose

In November 1991, the **Canadian Code of Preferred Packaging Practices** was released by the CCME. This document outlines a voluntary approach that industry can take to modify packaging practices in a manner consistent with the goals and objectives of the Protocol, emphasizing the use of source reduction, reuse, and recycling.

These packaging audit guidelines are a tool to assist brand owners, whether manufacturers or distributors, to assess and quantify the amount of packaging used to package and market their products. The audit will also provide essential information that companies will need to prepare packaging reduction workplans. These workplans are designed to minimize the amount of packaging used, and maximize diversion of the packaging waste that results from consumption of the companies' packages by the industrial and household consumer.

1.3 Responsibility for Completing Audits

Although it is recognized that all stakeholders play a role in reducing packaging waste in Canada, it is generally agreed that brand owners of packaged goods have the most control over the amount and design of packaging used to market a specific product. Brand owners can take specific steps to reduce the impact of packaging on the waste stream.

Brand owners who do not actually manufacture the products in question can nevertheless influence the type and amount of packaging used. They are also responsible for the packaging that will require a reuse or recycling infrastructure, or disposal. For the purpose of these guidelines, a brand owner may be a manufacturer, distributor, or importer of products.

Brand owners should use these guidelines to investigate the following opportunities for reducing packaging waste:

- eliminating or minimizing the amount of new packaging used to market their products;
- reducing the amount of new packaging used by selecting or designing packaging that is reusable, whenever possible;
- selecting or designing packages that enhance recyclability, and ensuring that the packages are, in fact, recycled.

Importers can reduce packaging waste by selecting products whose packaging is consistent with the NAPP goals, whenever possible.

Packaging audits will provide the information that a company needs in order to develop a comprehensive workplan to reduce its packaging use. Much of the information collected in a packaging audit is the same as that required by the National Task Force on Packaging in its biennial surveys to collect data on packaging in Canada. Companies should therefore already have the information.

These guidelines do not attempt to control the types of packaging being used, but rather to provide a standard format for estimating packaging use on a company-wide basis. **The Packaging Audit and Packaging Reduction Workplan** reports do not refer to specific targets to be met, but rather attempt to encourage the "best efforts" by companies to reduce packaging waste.

These guidelines are consistent with the **National Packaging Protocol** and the **Canadian Code of Preferred Packaging Practices** and should assist companies to achieve or exceed the national packaging waste diversion goals set out in the Protocol. The Protocol does not require individual companies to meet these targets but will focus on broader industry sectors.

The monitoring of progress in achieving packaging waste diversion is an important part of the total waste management process. The following is some of the important information that the audits and workplans will provide:

- a well-based and up-to-date estimate of progress in reducing packaging use;
- estimates of the potential for reducing packaging waste in future years;
- the cost and other implications of initiatives to reduce packaging waste;
- a clear understanding of industry's limitations/barriers and why the potential for packaging waste reduction may be limited in some instances.

1.4 Definitions

- *Package or packaging* refers to a material or item that is used to protect, contain, or transport a commodity or product. A package or packaging can also be a material or item that is physically attached to a product or its container for the purpose of marketing the product or conveying information about the product.
- *Packaging Audit* is a study that identifies and measures all the packaging materials and packaging used by a company.
- *Packaging Reduction Workplan* is an organized plan of work that when implemented will minimize the amount of packaging used, resulting in less packaging waste generated. The plan should describe specific activities, timetables, and expected results.
- *Reuse* in this guideline refers to packaging that comes from another establishment for use again in its current form.
- *Brand Owner* is the person or company within a province responsible for introducing a particular product to the marketplace. A brand owner may be a manufacturer, distributor, or importer of products.

2. The Packaging Audit

Companies will generally carry out a **Packaging Audit** and prepare a **Packaging Reduction Workplan** every two years. The audit will measure the current packaging use, as well as estimate packaging used in 1988.

In addition, it will assist companies to determine the amount of their packaging waste that is generated by consumers in both the current year and the base year of 1988.

During the development of the National Packaging Protocol, 1988 was selected as the base year from which progress towards targets will be measured. This base year is entrenched in the Protocol and should not change. For the purpose of the packaging audit, however, if data for 1988 are not available, any other year from 1988 to the present, for which good data are available, may be used as a base year. A later base year may be used if a company was not in business in 1988.

2.1 Key Features

The audit process and audit forms are designed to be as simple as possible, while providing useful information and enabling companies to measure all types of packaging reduction and packaging waste diversion initiatives undertaken since the base year.

Packaging material use, reuse, recycling rate, and recycled content are reported for each packaging type.

Although packaging weights are reported in absolute terms, it is important that the data also reflect any change in production or sales levels by the company. For this reason, an adjusted packaging reduction is

also reported to account for any swings in production from year to year. To calculate this, worksheets must be completed for each product, or each similar type and size of package.

By comparing the amount of new packaging used in the current year with that used in the base year, it is possible to measure any source reduction that has occurred. While source reduction is the preferred option for reducing the amount of packaging that ultimately requires disposal, it is not always possible.

Similarly, the weight of reused material in packaging is recorded for the base year and can be compared with the weight of reused material in the current year. Reuse of material results in direct diversion from disposal, with the most common example being the refillable beverage container.

The probability of a specific package being recycled depends on a number of factors that are often beyond the control of the company that introduced the package to the marketplace. Also, while it is possible to estimate a recycling rate for a particular material or packaging type, it is generally very difficult to calculate the recycling rate of a specific package of a specific company. Despite the above limitations, it is important to report the recycling rate in the packaging audits, since recycling is a major component of packaging waste diversion (see Appendix B). A company can influence the recycling rate of its packaging in several ways, such as selecting recyclable materials and ensuring that the complete package is recyclable, or by contributing to a recycling funding program.

The use of recycled content in packaging materials is actively encouraged, since it provides a market for recycled materials and, in effect, contributes indirectly to waste diversion. Recycled content is reported as a percentage for the base or previous year and also for the current year.

Reporting packaging material use, reuse, recyclability and recycled content for a previous year and the current year will enable comparison between the two years. However, no attempt will be made to total all diversion measures to calculate the net packaging reduction or diversion from disposal.

Categories for packaging material are based on, and consistent with, the category list contained in the Statistics Canada Survey (See Appendix A). If preferred, companies can use a "macro approach" to estimate the amount of packaging used for each packaging category. For example, rather than reporting all the different types of foam plastic used under 2.61, 2.62 and 2.63 on the form, the total amount of foam plastic can be reported under 2.6.

2.2 Sources of Data

Production or purchasing records are the best source of data for determining the amount of packaging used. For the current year and all subsequent years, this amount should be determined by totalling the number of each size and type of shipping unit produced or purchased. For example, if a company manufactures or distributes canned soup, all those products using the same type of package should be listed, i.e., 24 x 10 oz. cans. It would not be necessary to list all varieties

produced or purchased. The weight of each of the packaging components can easily be calculated from this total, provided that the unit weight of each component is known. The unit weight can be obtained from the manufacturer of the packaging material or by weighing each component on a scale.

Ideally, the same method should be used to determine the amount of packaging used for the base year of 1988. If packaging design has changed since the base year, it will be important to know the correct unit weight factors applicable at the time. Suppliers of packaging material can help in this respect. Alternatively, the unit weight can be reasonably estimated by using current unit weights adjusted by any weight difference resulting from design changes. If these records are not available, sales records, purchases, receiving records, etc. should all be considered as sources of data from which to estimate the amount of packaging used in 1988. The objective should be to estimate the amount of packaging used in 1988 as accurately as possible, based on the records available. If there has been little or no reduction in packaging since 1988, or if no records are available, any year from 1988 up to and including 1992 may be selected as a base year.

2.3 What to Include in the Audit

The audit should include all packaging and packaging materials used by the company to package products. All components of the products' packaging, including primary and secondary containers, closures, dispensing or applicator attachments, labels, shipping containers, partitions and dividers should

be audited, as well as material used for unitizing shipments, such as pallets, slip sheets, shrink or stretch wrap film, metal or plastic strapping, bulk containers, shrouds and caps. If it is not possible to allocate weights of unitizing material to individual Packaging Audit Worksheets, they may be reported as an overall total on the Summary Sheet.

Packaging materials used by suppliers to ship their products to the auditing company should not be included in the packaging audit.

2.4 Completing the Report Forms

The packaging audit report consists of three forms: the Packaging Audit Worksheet, the Packaging Audit Summary Sheet and a cover sheet (blank forms can be found in Appendix C).

2.4.1 The Packaging Audit Worksheet

One of these sheets must be completed for each distinct package type or size. It is not important how many product types use the particular package type or size, as long as the packages are the same.

Line 1.

Enter **Current Year.** (The year to which the audit refers)

Line 2.

Enter **Base Year or Previous Year.** This will change each time the audit is conducted. After completion of the first audit, the base year will, in effect, be the year in which the previous audit was conducted.

Line 3.

Enter **Company Name.**

Package Description. Use any format that best identifies the specific package type and size, e.g., "12 x 10 oz. soup cans", or simply "12 x 10 oz. can." The description should be applied to the final shipping unit, whether this is a corrugated case, bag, bale, etc.

Line 4.

Units in Base Year. Report the total number of these shipping units produced or purchased in the base year. Include all products packed in this specific type of package.

Units in Current Year. Report the same data for the current year.

Line 5.

Adjustment factor. This is obtained by dividing the number of units manufactured or purchased in the base or previous year by the number manufactured or purchased in the current year. This factor is used to adjust the current year's production or distribution levels to those of the previous year to allow a direct comparison to be made.

Main Table.

The left-hand column is headed **Packaging Material Category.** Materials used should be entered in this column, together with the material category code, based on the Statistics Canada Survey list. For a list of material categories and codes, refer to Appendix A. If unitizing materials such as pallets, stretch wrap, and banding can be accurately allocated to

individual worksheets, they should be recorded here. If this is not possible, the company's total usage of these materials should be summarized on the Summary Sheet. In this case, it will be necessary to use an average Adjustment Factor to arrive at the Adjusted Packaging Reduction. This can be done by dividing the overall base year's production or distribution by the overall current year's production or distribution, or alternatively, by taking a weighted average of the individual adjustment factors on the worksheets.

Starting with the first packaging component, enter the appropriate packaging material description in the left-hand column. Either a detailed description (micro) or general material category (macro) can be used. Succeeding columns are filled in opposite this category as follows:

New Material Used in Base or Previous Year - Record the weight of new material used in tonnes. See "Sources of Data" (Subsection 2.2) for ways to obtain this data.

New Material Used in Current Year - Record the amount of new material in this packaging component in the current year.

Adjusted Weight - Multiply the weight of new material used in the current year by the Adjustment Factor.

Packaging Material Reused in Base Year - Record the weight in tonnes. This is the weight of material that has already been used at least once and has come from another establishment for reuse in its same form.

Packaging Material Reused in Current Year - Record the weight in tonnes.

Adjusted Material Reused - Multiply the weight of material reused in the current year by the Adjustment Factor.

Recycling Rate - The recycling rate must be based on an established recycling system and must represent that proportion of the total packages produced that is likely to be recycled. Companies claiming these rates must be able to support their claim if requested.

Alternatively, recycling rates developed by the National Task Force on Packaging may be used (see Appendix B).

Recycled Content - Report the percentage of recycled content in each packaging component for the base or previous year and for the current year.

Comments - Space is provided at the bottom of the worksheet for comments and explanations regarding audit results. This space can be used to indicate how reductions were achieved, or why they could not be achieved.

Special Situations

- If a whole package type is **discontinued**, the Adjustment Factor should be marked with N/A and the Adjusted Weight column should be left empty.
- If a new package type is **introduced** before the current year, and was not included in the base year, the Adjustment Factor should be marked as above and the Adjusted Weight column should be left empty.

- If, between the base year and the current year, a package type is changed in size specifically to reduce packaging, the following procedure should be followed.

Enter the new package description on the worksheet. Under comments, describe the nature of the change and describe the package being used in the base year. The number of units of the new package manufactured in the current year should be reported in the usual way with the **equivalent number of units** manufactured reported for the base year. As an example, if 800,000 cases containing 12 bottles were produced in the base year and 500,000 cases containing 24 of the same bottles were manufactured in the current year, the current year would be reported as 500,000, but the base year would be reported as 400,000 (400,000 equivalent cases of 24 bottles). The Adjustment Factor is then calculated as usual.

This procedure may be applied to changes in shipping case sizes, as well as increases in container sizes to accommodate larger volumes or reduction in container sizes due to product redesign, provided that the new type of package completely replaces the old type.

2.4.2 The Packaging Audit Summary Sheet

From the packaging audit worksheets, total the weight of material used for each category in the base or previous year and in the current year and record in the appropriate column in the summary sheet.

Since recycled content may vary between different packages made of the same material, total recycled content cannot be reported on the summary sheet unless the percentage for a material type is the same on each worksheet.

Enter the total of all columns recording weights at the bottom of the sheet.

2.4.3 Packaging Audit - Cover Sheet

This sheet should be completed with all the information requested and signed by an officer of the company.

N.B. It is important to record how the base year figures for new material used were determined, i.e., production records with known component unit weights, estimated unit weights, purchases, sales, etc. This information will indicate the reliability of usage totals for the base year.

2.4.4 Sample Forms

The following are sample Packaging Audit forms. The company carrying out the audit is Acme Widgets Inc. The company is carrying out an audit of packaging materials used during 1992, the current year, and it has selected 1988 as its base year. This information is included at the top of both the summary sheet and the worksheets.

Acme has produced two products, widgets and cleaning fluid, since 1988.

- Widgets are packaged 100 in a folding carton. This carton is overwrapped with a polypropylene film, and 12 of these units are packed in a corrugated shipping case. The package description

has therefore been entered as 12 x 100 widgets. Details of packaging used for widgets are given on Worksheet #1.

- Cleaning fluid is packaged in 500-mL plastic bottles with plastic caps and 12 bottles are packed in a corrugated shipping case. Worksheet #2 gives details of this product's packaging.

Worksheet #1

In 1988, Acme produced or distributed 725,000 cases of widgets, i.e., 725,000 x 12 x 100 widgets. In 1992, production had increased to 850,000 cases. These numbers are reported under Packaging Units in Base Year and Packaging Units in Current Year. The Adjustment Factor of .853 is calculated by dividing the Base Year's Units by the Current Year's Units.

The packaging components are listed according to the Statistics Canada descriptions in the left-hand column, together with the material category codes. These are obtained from Appendix A.

In 1988, Acme used 11.17 tonnes of folding cartons as new material. Just before 1992, Acme reduced the calliper of cardboard used in the folding cartons by 10% to reduce packaging. In 1992, however, their production had increased and they actually used more new cartons. In fact, 11.79 tonnes of cartons were used. The Adjusted Weight is calculated by multiplying 11.79 by .853 = 10.057

In 1992, the folding cartons contained 100% recycled material and had a recycling rate of 5%. These figures are reported in the appropriate columns.

The film overwrap used to protect the folding cartons did not change between

1988 and 1992, but because of the increase in production or distribution, the usage increased. When the Adjusted Weight is calculated however, a zero change results.

In 1988, Acme used 1.96 tonnes of corrugated cases to ship their widgets. Corrugated cases are recyclable. In 1992, 2.26 tonnes of corrugated cases were used and the recycling rate was at 40%. The corrugated cases contained 10% recycled material.

In 1988, 2 tonnes of wood pallets were used and there was no reuse. In 1992, 1.34 tonnes of new pallets were used and 1 tonne was reused.

Worksheet #2

In 1988, Acme produced 800,000 cases of cleaning fluid, i.e., 800,000 x 12 x 500 mL bottles. In 1992, this had increased to 1,000,000 cases. These numbers are entered on Worksheet #2 and the Adjustment Factor of .800 is calculated by dividing the Base Year's Units by the Current Year's Units.

In 1988, Acme used 42.40 tonnes of plastic bottles. In 1990, the company reduced the wall thickness of the bottles by 15%, but in 1992 their production had increased. In the example, there was no recycling of the bottles. Since 1991, however, the bottles have contained 10% recycled material and this is shown as a percentage in the appropriate column.

In 1988, 9.60 tonnes of caps were used and, since no reduction occurred, the increase in weight during the current year was due entirely to the increase in production or distribution. The caps were not recycled and contained no recycled

content.

In the base year, 20 tonnes of corrugated cases were used and in 1992, 25 tonnes were used. When the numbers are adjusted to reflect package usage in the current year at 1988 levels, the reduction is zero. In 1992, the recycling rate for corrugated cases was 40% and contained 10% recycled material. In 1988, the cases contained no recycled material, but this increased to 10% in 1992.

In this example, 30 tonnes of new wood pallets were used in 1988 and 1 tonne was reused. In 1992, 27.5 tonnes of new pallets were used and 10 tonnes were reused.

Summary Sheet

The summary sheet shows the current year, the base year, the company name, and the number of worksheets included (2).

In the left-hand column, the packaging components from both worksheets are listed, as well as such items as stretch wrap film and pallets which were used for unitizing both products for shipment.

Each of the packaging types reported on the worksheets is listed on the summary sheet and the values for new material use are added.

Unitizing materials are included on the summary sheet as a separate item. Acme uses stretch wrap film to consolidate its loads on both products and all shipments are made on returnable pallets. Since Acme purchases these items for use on both products, it has reported the quantities used on the summary sheet only. The production of both products

increased and the purchase of new pallets to replace old ones stayed at a constant level. Acme used an adjustment factor of .82 to calculate the adjusted weight of film and pallets, which represents a realistic level for an overall production increase for both products.

PACKAGING AUDIT WORKSHEET # /

Current Year: 1992
 Base Year or Previous Year: 1988
 Company Name: Acxx Widgets, Inc.
 Package Description: 12x100 widgets
 Packaging Units in Base or Previous Year: 725,000
 Packaging Units in Current Year: 850,000
 Adjustment Factor: 0.853

Packaging Material Category	Weight of New Material Used (Tonnes)			Weight of Reused Material (Tonnes)		Recycling Rate (%)		Recycled Content (%)	
	Base or Previous Year	Current Year	Adjusted Weight	Base or Previous Year	Current Year	Base/Prev. Year	Curr. Year	Base/Prev. Year	Curr. Year
Folding cartons	1117	1179	10057				5		100
Film overwrap	027	032	027				0		0
Corrugated cases	196	226	193				40		10
Wood pallets	2	134	114		1	0853	80		0
Total	1540	1571	1340		1	0853			

Comments:

PACKAGING AUDIT WORKSHEET #2

Current Year:	1992	
Base Year or Previous Year:	1988	
Company Name:	Acme Widgets, Inc.	Package Description: 12 x 500 mL bottles
Packaging Units in Base or Previous Year:	800,000	Packaging Units in Current Year: 1,000,000
		Adjustment Factor: ..0.800.....

Packaging Material Category	Weight of New Material Used (Tonnes)			Weight of Reused Material (Tonnes)			Recycling Rate (%)		Recycled Content (%)	
	Base or Previous Year	Current Year	Adjusted Weight	Base or Previous Year	Current Year	Adjusted Weight	Base/Prev. Year	Curr. Year	Base/Prev. Year	Curr. Year
Plastic bottles	12.40	15.05	36.04					0		10
Plastic caps	9.60	12.00	9.6					0		0
Corrugated Cases	20	25	20					40		10
Wood pallets	30	27.5	22	1	10	8		80		0
Total	102	109.55	87.64	1	10	8				

Comments:

Number of Packaging Audit Worksheets attached: 2...

Packaging Material Category	Weight of New Material Used (Tonnes)			Weight of Reused Material (Tonnes)			Recycling Rate (%)		Recycled Content (%)
	Base or Previous Year	Current Year	Adjusted Weight	Base or Previous Year	Current Year	Adjusted Weight	Base/Prev. Year	Curr. Year	
Plastic bottles	2.14	42.40	45.05	36.04					
Plastic caps	2.50	9.60	12.00	9.6					
Film overwrap	2.30	0.27	0.32	0.27					
Folding cartons	1.21	11.17	11.79	10.057				5	100
Corrugated cases	1.10	21.96	27.26	21.93				10	10
Wood Pallets	3.10	32	28.84	23.14	1	11		80	
Total		117.40	125.26	101.037	1	11		8.853	

3. Preparing a Packaging Reduction Workplan

The **Packaging Audit** is used to measure the changes in packaging use, reuse, recycling, and recycled content achieved by a company from the base year to the year in which the audit is being carried out. It provides an overview of packaging use from which a workplan can be developed to reduce packaging. A **Packaging Reduction Workplan** provides information on what steps will be taken to reduce packaging or ultimately divert packaging waste from disposal.

3.1 Key Features

The workplan is designed to enable companies to estimate the amount of packaging that will be used in the next two-year period, using the results from the current packaging audit as a baseline. Projections are broken down into new packaging use avoided by reduction and reuse, and initiatives to increase recycling rate and recycled content.

3.2 Sources of Data

Data for both the base year and the current year can be taken directly from the current year's packaging audit. Projections for the next time period are based on plans to reduce packaging, reuse packaging, institute recycling programs, improve recyclability, and increase recycled content.

3.3 What to Include in the Workplan

All components of the products' packaging, including primary and secondary containers, closures, dispensing or applicator attachments, labels, shipping containers, partitions, dividers, etc. should be considered, as well as material

used for unitizing shipments, such as pallets, slip sheets, shrink or stretch wrap film, metal or plastic strapping, bulk containers, shrouds and caps. However, only those components for which initiatives will be undertaken need be reported on the Workplan Worksheets.

3.4 Completing the Packaging Reduction Workplan Forms

The packaging reduction workplan report consists of two forms: The Packaging Reduction Workplan Worksheet, and the Packaging Reduction Workplan Summary Sheet (blank sample forms can be found in Appendix C).

3.4.1 The Workplan Worksheet

There are four separate worksheets, one each for plans covering reduction, reuse, recycling, and recycled content. A worksheet for each of these initiatives should be completed by material category. The numbers should be based on total packaging used as in the audit summary sheet and not broken down by package type or size as in the packaging audit worksheet.

The **Current Year** and the **Period covered**, together with the **Company Name** should be entered at the top of the page.

Reduction or Diversion Initiatives

Packaging Material Categories should be entered from the Packaging Audit Summary Sheet.

Weight of Material Used in Current Year - Totals from the Packaging Audit Summary Sheet should be transferred to

the appropriate packaging material category in this column.

Action Taken - The planned waste reduction or diversion initiative should be briefly described in this column.

Planned Reduction - Report the estimated weight of packaging waste avoided or diverted through source reduction, in tonnes.

Date Implemented - This date should be the actual date that the program was, or is to be implemented.

The forms for reuse, recycling, and recycled content should be completed in the same manner.

3.4.2 The Workplan Summary Sheet

The **Current Year**, the **Period covered** should be entered at the top of the form together with the **Company Name** and the **Number of Worksheets** included.

Totals by packaging material category from each of the worksheets should be entered in the corresponding column in the Packaging Reduction Workplan Summary Sheet and added where appropriate.

3.4.3 Sample Forms

The following examples show how Acme Widgets Inc. prepared its workplan after completing its audit for 1992. Four worksheets have been completed, one each for reduction, reuse, recycling and recycled content.

All worksheets show the Current Year as well as the Company Name. The

Packaging Components that Acme has considered in its workplan are listed in the left-hand column. The weight of New Material Used in the Current Year is taken from the Packaging Audit Summary Sheet.

Worksheet #1

In Worksheet #1, the proposed actions to reduce the packaging are listed. For their plastic bottles, Acme plans to further reduce the wall thickness by 15%, and it estimates that this will save 6.76 tonnes of material, based on current production levels. The company anticipates having this in place by July 1993. No reduction is possible on plastic caps, but it is listed to indicate that this item was investigated. The company has determined that it can eliminate the overwrap, saving .32 tonnes. No further reduction is possible on the folding cartons, but Acme plans to cut back the flaps on their corrugated cases to achieve a 22% or 3.60 tonnes material reduction.

Worksheet #2

Worksheet #2 shows Acme's plan to reuse more of its wood pallets so that 18 tonnes will be reused each year, 7 tonnes more than in current year.

Worksheet #3

On Worksheet #3, Acme indicates that as a result of its efforts, together with other organizations in the carton and paperboard industries, by November 1993 folding cartons will be recyclable at an initial rate of 10%.

Worksheet #4

Worksheet #4 shows that Acme plans to increase the recycled content in its corrugated cases to 60% for both package types.

The Summary Sheet

The current year and period covered are both shown. The audit was carried out in 1992. The period is for 1992 to 1994. This means that changes should be in place by 1994. The number of worksheets attached is shown as 4.

The packaging materials are shown in the left-hand column, and cover all those materials contained in the worksheets. The weight reduced has been transferred from the Worksheet #1, the weight reused from Worksheet #2, the recycling rate is transferred from the recycling Worksheet #3, and the percentage of recycled content from Worksheet #4.

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1992.....

1992 - 1994

Company Name: Acme Widgets Inc.

REDUCTION INITIATIVES					
Packaging Material	Weight of Material Used in Current Year		Action	Planned Reduction	Date to be Implemented
	Code	Tonnes			
Plastic bottles	2 90	45 85	Reduce wall thickness by 15%	6.76	July 1993
Plastic caps	2 50	12 00	Investigated, however reduction is not possible.	0	September 1992
Overwrap	2 30	0 32	Eliminated use	0.32	January 1993
Corrugated cases	4 10	27 26	Reduce / Eliminate flaps	3.60	May 1993
Folding cartons	4 21	11 79	No further changes planned	0	
Total		96.42		10.68	

Comments:

PACKAGING REDUCTION WORKPLAN WORKSHEET #2

Current Year: 1992.....

For Period: 1992 - 1994.....

Company Name: Acme Widgets Inc.

REUSED PACKAGING					
Packaging Material	Code	Weight of Reuse in Current Year	Action	New Weight Reused	Date to be Implemented
		Tonnes		Tonnes	
Wood pallets	3.10	11	Set up return system with some clients	18	May 1993
Total		11			

Comments:

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For Period: 1992-1994

Current Year: 1992.....

Company Name: ..Acme Widget.....Inc..

RECYCLING

Comments:

45

Current Year: 1992.....

For Period: 1992 - 1994.....

Company Name: Acme Widgets, Inc.

RECYCLED CONTENT					
Packaging Material	Code	Recycled Content in Current Year	Action	New Recycled Content	Date to be Implemented
		Tonnes		Tonnes	
Corrugated cases	4 10	10	replace portion of recycled material in cases	60	December 1993
Total					

Comments:

Current Year: 1992.....
 Company Name: ... Acme Widgets, Inc.....
 Number of Packaging Workplan Worksheets Attached: 4.....
 For Period: 1992 - 1994.....

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4. Suggestions for Developing a Packaging Reduction Workplan

The Canadian Code of Preferred Packaging Practices provides some broad guidelines to follow when developing a Packaging Reduction Workplan. This publication is available from Environment Canada and Provincial Environment Ministries. There is also a useful checklist in the appendices of the Code which can be used to ensure that every possible option for packaging reduction has been considered.

The following suggestions provide a basis for the development of a workplan, and are also to stimulate ideas for other packaging reduction initiatives. Suggestions are presented according to the Three R hierarchy of reduce, reuse and recycle. Brand owners who do not manufacture their products can work with manufacturers to investigate options for packaging reduction or diversion from disposal.

4.1 Reduction

- Determine whether the package can be eliminated entirely. As an example, some hardware items can be merchandised in bins instead of using a sleeve or backing card to hang the product on a pegboard.
- If the entire package cannot be eliminated, perhaps one or more package components can be. A good example of this can be seen on some brands of toothpaste, which have eliminated the outer carton leaving the tube to stand alone on a redesigned cap.
- It may be possible to eliminate secondary or tertiary packaging by increasing primary packaging to achieve a net reduction. Conversely, a reduction in primary packaging might be possible through changes to secondary or tertiary packaging. The important thing is to ensure that a reduction in materials in one part of the package system does not lead to an increase in materials in another part of the system.
- Source reduction can sometimes be achieved by packaging geometry or structural design changes (e.g., lower packaging surface area to product volume ratios). For example, a low profile, cubic section carton uses less material than a taller carton with large face panel and narrow front-to-back dimensions with the same cubic capacity; similarly, cylindrical bottles use material more efficiently than bottles with oval sections. Another option to consider is reducing the size and use of flaps on corrugated shipping cases. Although this leaves an opening in the top and bottom of the shipper, there are many applications where this does not effect the functionality of the shipper.
- Determine whether the material thickness or basis weight can be reduced. For example, reductions may be possible in the calliper of cardboard used to make a folding carton, the wall thickness of a glass or plastic container, or the basis weight of a label stock.
- It may be possible to reduce the overall packaging volume by using different packaging materials or container types or by using new package or product technology. A good example of this kind of reduction is the pouch used as refill containers for detergents and other household cleaners. The use of a

flexible pouch has resulted in significant material weight savings over the more conventional plastic bottles. In this way, the product is made available in lightweight, smaller or concentrated refills so that the original container can be reused.

- It may be possible to change the product itself in order to reduce the amount of packaging, e.g., the product could be concentrated, made less fragile, or made in a more space-efficient shape or configuration.
- Source reduction can usually be achieved by replacing a number of smaller packages with a single larger, more efficient package size. Examples include family-size or bulk containers rather than individual portion packages and larger shipping containers.
- Changes to the transportation and distribution processes could result in less packaging being necessary.
- Suggestions can be sought from customers on source reduction possibilities for secondary and tertiary packaging.
- When considering the possibilities for package reduction, the use of toxic materials should be thoroughly reviewed. If any toxic materials are used when manufacturing packaging materials, check to see whether these can be eliminated or reduced to the minimum level possible. For example, the use of heavy metals in some printing inks poses a health threat during the manufacture, use and disposal of these inks, including the disposal of packaging to which they may be applied.

4.2 Reuse/Recycling

Reuse and recycling are post-use actions intended to divert used packaging materials from municipal solid waste sites. Opportunities for reuse and recycling should therefore be fully investigated.

The use of technically recyclable materials is not an acceptable means of reducing environmental impacts unless economically viable collection, processing and marketing systems are available for that material. If there is no such system in place, but the technology and market exist to develop one, then all parties involved should work together on its development.

- Consider ways in which the package or one of its components could be designed to be safely refilled or reused by the consumer. Several liquid cleaning products are now sold in plastic bottles, some with pumps or spray attachments. These bottles are intended to be refilled from lighter weight bottles without pumps or from flexible pouches.
- Determine whether the package or one of its components can be designed to be reusable for the same purpose without remanufacturing. The best example of this application is the returnable glass beverage bottle. Obviously there must be a suitable system in place, or capable of being put in place, to collect, return, and reuse these used packages.
- If current packaging is not recyclable, determine whether it can be made to be recyclable. Does the recycling technology exist? Is there a collection system in place, and is there a market

for the material?

- Consider ways in which the package could be redesigned to make it more recyclable. Determine whether a single material can be used in place of a multi-material container or whether a material that is not recyclable can be replaced with one that is.
- Consider whether materials are suitable for recycling. Determine the impact that additives, coatings, inks and pigments, adhesives, labels, combinations of multi-materials, and convenience features such as tear tapes or carrying handles, may have on the recycling process.
- If possible, the outer and inner packaging used for shipment and distribution of goods should also be recyclable.
- Reusable pallets should be used in preference to the one-trip variety, and other transportation-related packaging should be reusable whenever possible.
- Determine whether current packaging uses recycled material and in what proportion. Consider ways to use recycled material or increase the recycled content level. Use of **recycled** material in packaging materials is extremely important, since it provides the market for **recyclable** materials. Refer to Consumer and Corporate Affairs Canada's **Guidelines on Environmental Claims and Labelling** if using words or symbols to relay information on recyclability or recycled content of the packaging.

Appendix A

Statistics Canada Packaging Material Categories

1.00 Multi-Material	2.30 <u>Film, sheet, wrap, liners and strapping of plastic (polymers, propylene, polyethylene terephthalate)</u>
1.10 <u>Predominantly plastic by weight</u>	
1.20 <u>Predominantly paper by weight (e.g. milk/juice cartons, aseptic cartons, etc)</u>	2.40 <u>Carboys, bottles and flasks and similar articles</u>
1.21 Milk cartons	2.50 <u>Plastic stoppers, lids, caps and other closures</u>
1.22 Other, predominantly paper by weight	
1.30 <u>Predominantly metal by weight (e.g. aerosol cans)</u>	2.60 <u>Expanded foam</u>
1.31 Backed aluminum foil, of a thickness of less than 0.27 mm embossed not printed	2.61 Foam eggtrays, trays and containers
1.32 Other backed aluminum foil, predominantly metal by weight	2.62 Foam tumblers, cups, plates, platters, bowls, etc.
1.33 Other predominantly metal by weight	2.63 Other expanded foam
2.00 Plastic	2.70 <u>Other plastic</u>
2.10 <u>Boxes, cases, crates, drums, pails, cups and tubes (excluding foam)</u>	2.71 Other plastic packaging articles
2.11 Egg trays, other than foam	2.72 Self adhesive plastics, width less than 20 cm
2.12 Disposable containers of polystyrene (excluding foam) for food	2.73 Other plastic plates, sheets, film, foil
2.13 Plastic containers, tubs, pails, etc. for food	2.74 Plastic garment hangers
2.14 Plastic containers, drums, cans, vials, pails, etc. other than for food	2.75 Knotted netting of twine cordage and rope of nylon, polyesters or polypropylene
2.20 <u>Sacks, bags and flexible liners (including cones), of plastic (polymers, ethylene)</u>	2.76 Other plastic
	3.00 Wood
	3.10 <u>Pallets, box pallets and other load boards of wood</u>
	3.20 <u>Other woods (including cases, boxes, baskets, bins, barrels and cores)</u>

- | | |
|---|--|
| <p>3.21 Cases, boxes, crates, drums, bins, barrels, cores and similar packagings of wood</p> <p>3.22 Clothes hangers</p> <p>3.23 Other articles of wood</p> <p>3.24 Twine, cordage, ropes, and cables of jute, sisal, etc.</p> <p>3.25 Other wood</p> <p>4.00 Paper and Cardboard</p> <p>4.10 <u>Corrugated cartons, boxes and cases</u></p> <p>4.11 Corrugated paper and paperboard, whether or not perforated</p> <p>4.12 Cartons, boxes and cases of corrugated paper or paperboard</p> <p>4.13 Other paper and cardboard</p> <p>4.20 <u>Non-corrugated boxes, cartons and cases</u></p> <p>4.21 Folding cartons, boxes and cases of non-corrugated paper or paperboard</p> <p>4.22 Set-up boxes of non-corrugated paper or paperboard</p> <p>4.23 Other non-corrugated boxes, cartons and cases</p> <p>4.30 <u>Sacks and bags, base width 40 cm or more</u></p> <p>4.40 <u>Sacks and bags (including cones), base width under 40 cm</u></p> <p>4.50 <u>Drums, cans, canisters, tubes</u></p> <p>4.51 Wood drums, cans, canisters including record sleeves</p> <p>4.52 Wood bobbins, spools and cops and similar supports</p> <p>4.53 Other drums, cans, canisters, tubes</p> | <p>4.60 <u>Trays, dishes, plates, cups, cartons, dividers of paperboard and pulp</u></p> <p>4.61 Cups, food packaging of paper or paperboard</p> <p>4.62 Trays, dishes, plates, cups and the like of paper and paperboard</p> <p>4.63 Egg cartons, trays, plates, etc. of moulded or pressed articles of paper pulp</p> <p>4.64 Paper pads, gift tyings, dividers, etc.</p> <p>4.65 Other trays, dishes plates, cups, cartons, dividers of paperboard and pulp</p> <p>4.70 <u>Labels and tags of paper</u></p> <p>4.80 <u>Other paper (including record sleeves, wrappers and wrapping paper), kraft paper and paperboard</u></p> <p>5.00 Textiles</p> <p>5.10 <u>Textile sacks, bags and wrapping of jute or other textile based fibres used for packaging food</u></p> <p>6.00 Glass</p> <p>6.10 <u>Clear glass containers</u></p> <p>6.11 Ampoules of clear glass</p> <p>6.12 Carboys, bottles, flasks, jars, etc. of clear glass</p> <p>6.13 Other clear glass containers</p> <p>6.20 <u>Coloured glass containers</u></p> <p>6.21 Ampoules of coloured glass</p> <p>6.22 Carboys, bottles, flasks, jars, etc. of coloured glass</p> |
|---|--|

6.23	Other coloured glass containers	<u>shippers, etc.</u>
7.00	Metal	7.70 <u>Stoppers, lids, caps and other closures</u>
7.10	<u>Food and beverage containers (excluding aluminum), including steel cans or containers of a capacity of less than 50 litres for food and beverage</u>	7.71 Crown corks
		7.72 Stoppers, lids, caps and other closures
		7.73 Other stoppers, lids, caps and other closures
7.20	<u>Other metal containers with a capacity of less than 50 litres (excluding aluminum)</u>	7.80 <u>Other metal (including strapping, wire and industrial staples)</u>
7.21	Cans, metal containers of a capacity of less than 50 litres (excluding aluminum)	7.81 Steel strapping
		7.82 Wire of iron or non-alloy steel
		7.83 Wire of stainless steel
7.22	One-trip shippers for compressed or liquified gas (excluding aluminum)	7.84 Other metal (including strapping, wire and industrial staples)
7.23	Other metal containers with a capacity of less than 50 litres (excluding aluminum)	8.00 Miscellaneous
7.30	<u>Other metal containers with a capacity of 50 litres or more (excluding aluminum), including steel tanks, drums and other metal containers</u>	
7.40	<u>Metal foils, foil containers, collapsible tubes (excluding multi-material)</u>	
7.41	Metal foils and foil containers	
7.42	Collapsible, tubular containers (excluding multi-material)	
7.43	Other metal foils, foil containers, collapsible tubes (excluding multi-material)	
7.50	<u>Aluminum food and beverage containers or cans</u>	
7.60	<u>Other aluminum containers including aluminum barrels, drums</u>	

Established Recycling Rates for Packaging Materials

Important Note Relating to Recycling Rates

Recycling rates for the packaging groups outlined in Appendix A are currently under development by the National Task Force on Packaging. It is anticipated, that initially, only national recycling rates will be available for use in completing the Packaging Audit and Packaging Reduction Workplan.

Preliminary national recycling rates based on development of packaging estimates for the National Packaging Protocol baseline year of 1988 will be released by the Task Force. These rates will be finalized after the data from the 1990 and 1992 Packaging Surveys have been analyzed. National recycling rates for 1990 and 1992 should be available by Autumn 1992 and 1993, respectively. Release of these rates will be announced in the NAPP News, via a general media release and to industry associations. To obtain the latest national recycling rates, contact your provincial, territorial or federal environment ministry (addresses provided on the inside back cover); or the CCME Secretariat.

It is important to note that companies which manufacture products or packages for a regional/provincial market must use caution in applying national recycling rates to their products due to the fact that they may not reflect the actual amount of that company's packages that are being recycled.

Over time, as reliable province-specific data become available, provincial recycling rates will be developed that will provide a more accurate determination of the percentage of a specific packaging material that is recycled in each province.

Packaging Audits and Packaging Reduction Workplans

(CCME EPC-NAPP-44E, June 1992)

Addendum to Appendix B: Recycling Rates for 1988

Packaging Material Category	Code	Estimated Recycling Rate
Multi-Material	1.0	N/A
Plastic (all)	2.0	2.0
Wood (all)	3.0	3.2
Paper and Cardboard	4.0	
Corrugated cartons	4.1	37.4
Non-corrugated cartons	4.2	14.6
Other	4.3-4.8	N/A
Textiles	5.0	N/A
Glass (all)	6.0	6.4
Metal (except aluminum)	7.1-7.4 7.7-7.8	4.8
Aluminum	7.5-7.6	42.4

Source: 1988 Statistics Canada Survey of Manufacturers and estimates developed by the National Task Force on Packaging

Notes:

1. N/A - Data not available
2. Recycling Rate = $\frac{\text{Amount recycled}}{\text{New Amount Used (does not include reuse)}}$

Forms

PACKAGING AUDITS and PACKAGING REDUCTION WORKPLANS

*Guidelines to help industry meet the goals of the
National Packaging Protocol*

Packaging Material	Code	WEIGHT REDUCED (Tonnes)	WEIGHT REUSED (Tonnes)	RECYCLING RATE (%)	RECYCLED CONTENT (%)
Total					

The Canadian Council of the Ministers of the Environment (CCME) is the major intergovernmental forum in Canada for discussion and joint action on environmental issues of national, international and global concern. Environmental ministers from each of the ten provinces, the federal government and the two territories participate in meetings at least twice a year. They discuss environmental issues, exchange information, make decisions and establish policy for work to be carried out under the auspices of CCME.

Canadian Council of Ministers of the
Environment Secretariat
326 Broadway, Suite 400
Winnipeg, Manitoba
R3C 0S5



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Packaging Audits and Packaging Reduction Workplans

*Guidelines to help industry
meet the goals of the
National Packaging Protocol*

Canadian Council of Ministers of the Environment
(CCME)

Foreword

These guidelines have been prepared by the National Task Force on Packaging. The Task Force is a "multi-stakeholder" group consisting of representatives from federal, provincial, territorial and municipal governments as well as environmental, industry and consumer groups.

The **Packaging Audits and Packaging Reduction Workplans** along with the related document, **Canadian Code of Preferred Packaging Practices** (CCME EPC-NAPP 35E, November 1991), are part of the Task Force's commitment to helping packaging producers and users achieve the targets contained in the National Packaging Protocol.

Special mention must be made of the important work of the Waste Reduction Office of the Ontario Ministry of the Environment in drafting this document and synthesizing the comments of Task Force members and twenty industry associations.

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APPENDIX A

Ministry of Environment and Energy – Regional and District Offices

Central Region

Halton - Peel District Office
1235 Trafalgar Road, #401
Oakville, ON L6H 3P1
Tel. #: (905) 844-5747
Fax #: (905) 842-1750

Toronto Regional and York -
Durham District Offices
7 Overlea Blvd., 4th Floor
Toronto, ON M4H 1A8
Tel. #: (416) 424-3000
Fax #: (416) 325-6345

West Central

Cambridge District Office
P.O. Box 219
320 Pinebush Road
Cambridge, ON N1R 5T8
Tel. #: (519) 622-8121
Fax #: (519) 622-3119

Hamilton District Office
Box 2112
119 King St. West, 12th floor
Hamilton, ON L8N 3Z9
Tel. #: (905) 521-7650
Fax #: (905) 521-7806

Welland District Office
637-641 Niagara Street North
Welland, ON L3C 1L9
Tel. #: (905) 384-9845
Fax #: (905) 735-0574

Mid-Ontario Region

Barrie District Office
54 Cedar Point Drive, Unit 1203
Barrie, ON L4N 5R7
Tel. #: (705) 726-1730
Fax #: (705) 726-5100

Muskoka Haliburton District Office
483 Bethune Drive
Gravenhurst, ON P0C 1G0
Tel. #: (705) 687-6647
Fax #: (705) 687-3715

North Bay District Office
Northgate Plaza
1500 Fisher Street
North Bay, ON P1B 2H3
Tel. #: (705) 476-1001
Fax #: (705) 476-0207

Sudbury District Office
199 Larch Street, 11th Floor
Sudbury, ON P3E 5P9
Tel. #: (705) 675-4501
Fax #: (705) 675-4180

Southeastern Region

Belleville District Office
470 Dundas Street East
Belleville, ON K6H 1C1
Tel. #: (613) 962-9208
Fax #: (613) 962-6809

Cornwall District Office
205 Amelia Street
Cornwall, ON K6H 3P3
Tel. #: (613) 933-7402
Fax #: (613) 933-6402

Kingston District Office
133 Dalton Street
Kingston, ON K7K 6C2
Tel. #: (613) 549-4000
Fax #: (613) 548-6920

Ottawa District Office
2435 Holly Lane
Ottawa, ON K1V 7P2
Tel. #: (613) 521-3450
Fax #: (613) 521-5437

Peterborough District Office
1477 Lansdowne Street West
Peterborough, ON K9J 7M3
Tel. #: (705) 743-2972
Fax #: (705) 748-4192

Southwestern Region

London Regional Office
985 Adelaide Street South
London, ON N6E 1V3
Tel. #: (519) 661-2200
Fax #: (519) 661-1742

Owen Sound District Office
1180 - 20th Street East
Owen Sound, ON N4K 6H6
Tel. #: (519) 371-2901
Fax #: (519) 371-2905

Sarnia Area Office
265 Front Street North, #109
Sarnia, ON N7T 7X1
Tel. #: (519) 336-4030
Fax #: (519) 336-4280

Windsor District Office
250 Windsor Avenue, 6th floor
Windsor, ON N6A 6V9
Tel. #: (519) 254-2546
Fax #: (519) 254-5894

Northern Region

Kenora District Office
P.O. Box 5150
808 Robertson Street
Kenora, ON P9N 1X9
Tel. #: (807) 468-2718
Fax #: (807) 468-2735

Sault Ste. Marie District Office
747 Queen Street
Sault Ste. Marie, ON P6A 2A8
Tel. #: (705) 949-4640
Fax #: (705) 945-6868

Thunder Bay Regional Office
P.O. Box 5000
435 James Street South, 3rd Floor
Thunder Bay, ON P7C 5G6
Tel. #: (807) 475-1205
Fax #: (807) 475-1754

Timmins District Office
83 Algonquin Blvd. West
Timmins, ON P4N 2R4
Tel. #: (705) 268-3222
Fax #: (705) 264-7336

APPENDIX B

Standard Industrial Classification (SIC) Codes

DIVISIONS, MAJOR GROUPS, INDUSTRY GROUPS AND INDUSTRY CLASSES

- | | |
|--|--|
| | 105 - Flour, Prepared Cereal Food and Feed Industries
1051 Cereal Grain Flour Industry
1052 Prepared Flour Mixes and Prepared Cereal Foods Industry
1053 Feed Industry |
| | 106 - Vegetable Oil Mills (Except Corn Oil)
1061 Vegetable Oil Mills (Except Corn Oil) |
| | 107 - Bakery Products Industries
1071 Biscuit Industry
1072 Bread and Other Bakery Products Industry |
| | 108 - Sugar and Sugar Confectionery Industries
1081 Cane and Beet Sugar Industry
1082 Chewing Gum Industry
1083 Sugar and Chocolate Confectionery Industry |
| | 109 - Other Food Products Industries
1091 Tea and Coffee Industry
1092 Dry Pasta Products Industry
1093 Potato Chip, Pretzel and Popcorn Industry
1094 Malt and Malt Flour Industry
1099 Other Food Products Industries
n.e.c. |
| DIVISION E - MANUFACTURING INDUSTRIES | |
| MAJOR GROUP 10 - FOOD INDUSTRIES | |
| 101 - Meat and Poultry Products Industries
1011 Meat and Meat Products Industry (Except Poultry)
1012 Poultry Products Industry | |
| 102 - Fish Products Industry
1021 Fish Products Industry | |
| 103 - Fruit and Vegetable Industries
1031 Canned and Preserved Fruit and Vegetable Industry
1032 Frozen Fruit and Vegetable Industry | |
| 104 - Dairy Products Industries
1041 Fluid Milk Industry
1049 Other Dairy Products Industries | |
| | MAJOR GROUP 11 - BEVERAGE INDUSTRIES |
| | 111 - Soft Drink Industry
1111 Soft Drink Industry |
| | 112 - Distillery Products Industry
1121 Distillery Products Industry |
| | 113 - Brewery Products Industry
1131 Brewery Products Industry |
| | 114 - Wine Industry
1141 Wine Industry |

DIVISIONS, MAJOR GROUPS, INDUSTRY GROUPS AND INDUSTRY CLASSES

**MAJOR GROUP 37 - CHEMICAL
AND CHEMICAL PRODUCTS
INDUSTRIES**

- 371 - Industrial Chemicals Industries n.e.c.
 - 3711 Industrial Inorganic Chemical Industries n.e.c.
 - 3712 Industrial Organic Chemical Industries n.e.c.

**MAJOR GROUP 27 - PAPER AND
ALLIED PRODUCTS
INDUSTRIES**

- 271 - Pulp and Paper Industries
 - 2711 Pulp Industry
 - 2712 Newsprint Industry
 - 2713 Paperboard Industry
 - 2714 Building Board Industry
 - 2719 Other Paper Industries

- 272 - Asphalt Roofing Industry
 - 2721 Asphalt Roofing Industry

- 273 - Paper Box and Bag Industries
 - 2731 Folding Carton and Set-Up Box Industry
 - 2732 Corrugated Box Industry
 - 2733 Paper Bag Industry

- 279 - Other Converted Paper Products Industries
 - 2791 Coated and Treated Paper Industry
 - 2792 Stationery Paper Products Industry
 - 2793 Paper Consumer Products Industry
 - 2799 Other Converted Paper Products Industries n.e.c.

- 372 - Agricultural Chemical Industries
 - 3721 Chemical Fertilizer and Fertilizer Materials Industry
 - 3722 Mixed Fertilizer Industry
 - 3729 Other Agricultural Chemical Industries

- 373 - Plastic and Synthetic Resin Industry
 - 3731 Plastic and Synthetic Resin Industry

- 374 - Pharmaceutical and Medicine Industry
 - 3741 Pharmaceutical and Medicine Industry

- 375 - Paint and Varnish Industry
 - 3751 Paint and Varnish Industry

- 376 - Soap and Cleaning Compounds Industry
 - 3761 Soap and Cleaning Compounds Industry

- 377 - Toilet Preparations Industry
 - 3771 Toilet Preparations Industry

- 379 - Other Chemical Products Industries
 - 3791 Printing Ink Industry
 - 3792 Adhesives Industry
 - 3799 Other Chemical Products Industries n.e.c.

For more information, please contact:

Canadian Council of Ministers of the
Environment
326 Broadway, Suite 400
Winnipeg, Manitoba
R3C 0S5

Office of Waste Management
Environment Canada
Ottawa, Ontario
K1A 0H3

Environmental Protection Division
B.C. Ministry of Environment, Lands and
Parks
3rd Floor, 777 Broughton Street
Victoria, British Columbia
V8V 1X5

Publications
Alberta Environment
14th Floor, 9820-106 Street
Edmonton, Alberta
T5K 2J6

Policy and Planning Branch
Yukon Department of Renewable Resources
10 Burns Street, P.O. Box 2703
Whitehorse, Yukon
Y1A 2C6

Pollution Control Division
Northwest Territories Renewable Resources
P.O. Box 1320
6th Floor, Courthouse
Yellowknife, Northwest Territories
X1A 2L9

Saskatchewan Environment and Public
Safety
Walter Scott Building
3085 Albert Street
Regina, Saskatchewan
S4S 0B1

Waste Reduction and Prevention Branch
Manitoba Department of the Environment
960-330 St. Mary Avenue
Winnipeg, Manitoba
R3C 3Z5

Waste Reduction Office
Ontario Ministry of the Environment
40 St. Clair Avenue West
Toronto, Ontario
M4V 1M2

Direction de la récupération et du recyclage
Ministère de l'Environnement du Québec
2360 Sainte-Foy Street, 1st Floor
Sainte-Foy, Quebec
G1V 4H2

Solid Waste and Recycling Section
New Brunswick Environment
P.O. Box 6000
Fredericton, New Brunswick
E3B 5H1

Municipal Waste and Resource Recovery
Nova Scotia Department of the
Environment
P.O. Box 2107
Halifax, Nova Scotia
B3J 3B7

Environmental Protection Division
P.E.I. Department of the Environment
11 Kent Street, P.O. Box 2000
Charlottetown, Prince Edward Island
C1A 7N8

Licensing and Enforcement
Newfoundland Environment and Lands
P.O. Box 8700, 4th Floor
Confederation Building, West Block
St. John's, Newfoundland
A1B 4J6

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PACKAGING AUDIT SUMMARY SHEET

Current Year:

Base Year or Previous Year:

Company Name:

Lumber of Packaging Audit Worksheets attached:

[illegible]

PACKAGING AUDIT & PACKAGING REDUCTION WORKPLAN REPORT

Business name : _____

Name of C.E.O.: _____

Business Address: _____

Telephone : () - -

Fax : () - -

Company Information

Standard Industrial Classification (SIC) Code : _____

Number of Employees : _____

Type of Product(s) or Service(s) : _____

Person completing this report

Name: _____

Company : _____
(If different)

Title : _____

Telephone : () - -

Fax : () - -

Source of 1988 Data : _____

These packaging audits and workplans have been carried out according to the guidelines published by the Canadian Council of Ministers of the Environment.

Signed : _____

Title : _____

Date : _____

PACKAGING REDUCTION WORKPLAN WORKSHEET

Current Year:
For Period:

For Period:

Company Name:

REDUCTION INITIATIVES					
Packaging Material	Code	Weight of Material Used in Current Year	Action	Planned Reduction	Date to be Implemented
		Tonnes		Tonnes	
Total					

Comments:

PACKAGING REDUCTION WORKPLAN WORKSHEET

Current Year:

For Period:

Company Name:

REUSED PACKAGING					
Packaging Material	Code	Weight of Reuse in Current Year	Action	New Weight Reused	Date to be Implemented
		Tonnes		Tonnes	
Total					

Comments:

